Fishery Technology
1997, Vol. 34(1) pp : 1 - 3

Use of *Phaseolus trilobatus* as Protein Source in the Diet of *Labeo rohita* Fingerlings

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In the present study groundnut cake was partially replaced with whole seeds of *Phaseolus trilobatus* at 20%, 40% or 60% levels and the pelleted feeds were fed to the fingerlings of *Labeo rohita*. The growth performance of the test groups was compared with the control group fed on groundnut cake based pelleted feed over a period of six months. Though all the test groups exhibited significant increase in growth parameters compared to control group, the best growth parameters compared to control group, was observed at 20% inclusion level.

Key words : *Phaseolus trilobatus*, protein source, *Labeo rohita*, growth, feeding studies.

Groundnut oil cake and ricebran are the common feed ingredients used in raising carp in Andhra Pradesh. Owing to the increasing use of groundnut cake in poultry and cattle feed, it has become necessary to search for cheap and novel protein sources. In the present study, the seed-meal of *Phaseolus trilobatus* was selected as test protein to know the feasibility of partially replacing groundnut cake and wheat bran with this new protein source.

There are instances of the use of *Phaseolus* in fish nutrition. De Silva *et al.* (1988) observed that replacement of *Phaseolus aureus* at 25% level resulted in the best performance in *Oreochromis niloticus*. However, in the same sp., Keembiyehetty & De Silva (1993) observed that replacement of fish meal by *Phaseolus mungo* resulted in reduced weight gain.

Materials and Methods

The feeding experiment was conducted in the aquaria of 4'x1½'x1' size. Water was changed every alternate day and continuous aeration was provided. Fingerlings of *Labeo rohita* measuring 6.5-7.5 cm were used in the present study. Experimental fish (10 nos.) were maintained in triplicate with corresponding controls.

Pillipesara (*Phaseolus trilobatus*) is an annual legume plant. It is widely used as cattle feed, green manure and raised in alternate and mixed cropping to increase soil fertility. The seeds are used as an ingredient in cattle feed.

Whole seeds of *Phaseolus trilobatus*, groundnut cake, wheatbran and maize were purchased from the local market. All the ingredients were thoroughly dried and powdered. *Phaseolus trilobatus* was included in the diet at 20%, 40% or 60% level. All the diets were made isonitrogenous at 35% protein level. Ingredients were mixed in required proportion (Table 1). One percent Sodium alginate was used as binder. Feed was made into dough and autoclaved for 20 min, then vitamin and

mineral mix were added according to NRC (1977) recommendations and 2 mm pellets were made. Feed was sundried followed by oven drying and stored in airtight bottles until further use.

Feed ingredients and the experimental diets were analysed for proximate composition such as % moisture, crude protein, ether extract and total ash according to A.O.A.C. (1990) (Table 1).

Table 1. Percentage composition of feed ingredients and proximate composition of fish feeds

Ingredients	Control	*Phaseolus trilobatus*		
		20%	40%	60%
Groundnut cake	70	59	50	38
Wheat bran	20	10	3	0
Maize	8	9	5	0
Phaseolus trilobatus	-	20	40	60
Vitamin mix	1	1	1	1
Mineral mix	1	1	1	1
Proximate composition (g/100 gm)				
Dry matter	90.63	91.70	90.93	90.26
Crude protein	36.32	35.32	35.98	35.63
Ether extract	4.05	3.72	3.83	3.65
Total ash	13.37	15.30	15.07	14.74

As the feed selected for the experimental studies was not a natural feed for *Labeo rohita*, the fish were fed with the control feed partially substituted with test feeds to know the acceptability and palatability. Aquaria were kept at ambient temperature and the water from the same source was used throughout the experimental regimen. After acclimatisation, fishes were fed @ 3% of the body weight twice daily. The unconsumed feed was removed daily. The fish were weighed once in fifteen days and the feed was adjusted accordingly.

At the end of six months, the growth parameters like mean body weight, specific growth rate (SGR), feed conversion ratio (FCR), viscerosomatic index (VSI) and hepatosomatic index (HSI) were estimated. For all the growth parameters mean of ten values was taken. The experimental data was analysed by students 't' test (Pillai & Sinha, 1968).

Results and Discussion

The rohu fingerlings accepted the formulated diet well and there was no mortality. Though all the test diets supported in significant weight gain compared to control, 20% inclusion of *Phaseolus trilobatus* resulted in the highest weight gain (30.35%), SGR (0.520), VSI (5.53) and the corresponding lowest FCR (5.58). However, the highest HSI (2.72) was observed at 40% inclusion level (Table 2).

The increased weight gain observed in the test groups may be due to high digestibility of *Phaseolus* protein for rohu fingerlings. There seems to be no previous reference on the use of *Phaseolus trilobatus* in rohu feeds. De Silva *et al.* (1980) used green gram, *Phaseolus aureus* in the diets of *Oreochromis niloticus*. According to them digestibility of green gram protein is high and the legume has a good amino acid profile. Neverthless, only lower inclusion levels were suggested by them. Same authors also observed that when green gram replaced fish meal, there was no appreciable decrease in growth performance. However, when black gram, *Phaseolus mungo* was used, there was reduced growth with increasing level of blackgram in feed (Keembiyehetty & De Silva, 1993), which was attributed to low digestibility of this feed at higher

Table 2. Growth performance of Labeo rohita fed on experimental diets

(n=10)

	Control		*Phaseolus trilobatus*		
	Initial	Final	20%	40%	60%
1) Mean body weight (g)					
Mean	5.450	10.180	13.270***	12.220***	11.830***
S.E.	±0.245	±0.269	±0.327	±0.107	±0.189
Variation over control, %			30.350	20.040	16.210
2) Specific growth rate					
Mean	-	0.330	0.520**	0.380*	0.360NS
S.E.		±0.011	±0.021	±0.019	±0.024
3) FCR					
Mean	-	8.20	5.580**	6.250**	6.540*
S.E.		±0.255	±0.656	±0.383	±0.543
Variation over control, %			-31.950	-23.780	-20.240
4) VSI					
Mean	3.200	4.380	5.530**	5.320	5.170*
S.E.	±0.100	±0.166	±0.242	±0.251	±0.256
Variation over control, %			26.260	21.460	18.040
5) HSI					
Mean	0.800	1.890	2.680***	2.720***	2.550***
S.E.	±0.058	±0.071	±0.052	±0.081	±0.092
Variation over control, %			41.800	43.920	34.920

* p 0.05; ** p 0.01; *** p 0.001, NS - Not significant

inclusion levels. According to Webster *et al.* (1995) fish meal can be totally replaced by soyabean meal in the diets of blue catfish, *Ictalurus furcatus* Lesueur. Even diets incorporated with leaf meals like *Eichhornia, Colocassia* and *Gliricidia* were observed to support high growth rates in rohu (Das *et al.* 1994). These observations point out that the growth response of the fish varies depending on size, species and the control feed with which the results were evaluated.

The results of the present study indicate that *Phaseolus trilobatus* can be included in the diets of fingerling *Labeo rohita* and the optimum inclusion level is 20%.

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