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Effect of Supplementation of Selected Plant Leaves as Growth Promoters of Tilapia Fish (*Oreochromis Mossambicus*)

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Abstract

An investigation was carried out to evaluate the effect of selected plants (Sesbania grandiflora, Moringa oleifera, Coleus aromaticus, Ocimum basilicum and Solanum verbascifolium) supplemented feed on the growth parameters such as length gain, weight gain and specific growth rate of Oreochromis mossambicus. Five experimental feeds were prepared by adding 5 grams of plant powder to the basal diet and one control feed without plant powder. The fishes were supplemented with these feeds for 45 days and the results were obtained for every 15 days once. The data were anaylzed usinh one way analysis of variance (ANOVA) and the means were separated using least significant differences. The fishes fed with Moringa oliefera supplemented feed showed maximum increase in weight (0.96%, 1.33%, 1.78%) and specific growth rate. The maximum increase in length was observed in the fishes that were fed Ocimum basilicum supplemented feed (1.2%, 1.6%, 2.0%). This study indicated that inclusion of plant ingredients in fish feed resulted in superior growth performance and the formulation of plant based diet for fish will provide new opportunities.

Keywords: Tilapia, plant supplemented feed, growth.

Introduction

Fish is an important part of diet for a large proportion of the people living in the developing world. Fish food represents the primary source of animal protein for a billion of people in the 58 countries world wide[1]. The contribution of fisheries in India is very promising and important for creating job opportunities for unemployed people, earning foreign exchange, alleviating poverty and improving nutritional status of the people[2]. By 2030, the addition of 2 billion more people to the world population will mean that aquaculture will need to produce nearly double that, 85 million tones of fish per year just to maintain current consumption levels[1]. It is estimated that the total feed cost in culture accounts for 30 to 70% of production cost, depending upon the type of culture and intensity of feeding[3]. There is a limit to the maximum growth rate beyond which further increment is possible only through genetic manipulation of administration of growth promoters that act pharmacologically to improve metabolic and / or digestive processes [4].

There are large number of feed additives available to improve fish growth performance some of these additives used in feed mill are chemical products especially hormones and antibiotics may cause unfavorable side effects[5]. Plants are natural sources of safer and cheaper chemicals. Plant products have been reported to promote various activities like anti stress, tonic, antimicrobial, growth promotion, appetite stimulation and immunostimulation in aquaculture practices[6,7]. Recently in aquaculture numerous medicinal plant extract have been tested in good results for the growth of fishes.

Material and Methods

An investigation was carried out in our laboratory to evaluate the effect of formulated feed on the growth of Tilapia fish (*Oreochromismossambicus).* The materials and methods used for the present study are described under the following headings.

Collection and Acclimation of Experimental Animal: The experimental animal selected for present study was tilapia fish (*Oreochromis mossambicus).*The fish was collected from Aliyar dam near Pollachiand were acclimatized to fresh water condition for 2-3 weeks in laboratory. Care was taken to avoid contamination.

Collection of Plants: Fresh leaves of *Sesbania grandiflora, Moringa oleifera, Coleus aromaticus, Ocimum basilium* and *Solanum verbascifolium* were collected.

Prerparation of Plant Powder: Fresh leaves of selected plants were collected, washed, shed dried and ground into fine powders and used for preparation of feed.

Preparation of Fish Feed: Fish feed was prepared by adding equal proportions of soya bean powder, wheat flour and coconut oil cake in the ratio of 1:1:1 and corn flour as a binder.These

substances were mixed thoroughly with hot water and it was steamed for 25-30 minutes and then cooled at room temperature for 30 minutes and the multi vitamin and mineral tablets were added and pellets were prepared by using domestic appliances with 0.5mm diameter. It was dried as a small pellet by keeping in the sun. Five experimental diets were prepared by adding 5 grams of plant powders separately and the feed without plant powder was kept as control.

Experimental Setup: The laboratory experiment was laid in completely randomized design (CRD). Three replications from each concentration and control were maintained simultaneously. The experiment was conducted using 15 liter plastic troughs. The troughs were stocked with 10 fishes with mean initial body weight of 5 ± 5.5 grams. The fishes were starved for a night prior to the experiment. The experiment was conducted for 45 days and the fishes were fed with experimental diets. The medium was changed daily in order to remove the faecal and unconsumed wastes.

Growth Parameters: After 45 days feeding trail the following observations were recorded for each treatment and control every 15 days once: i. Length gain = Final length of the fish – Initial length of the fish/ No of Days, ii. Weight gain = Final weight of the fish – Initial weight of the fish/ No of Days, iii. Specific growth rate = final weight of the fish – Initial weight of the fish*100/ No of Days

Statistical Analysis: The data on growth parameters were transformed into arc sine values before subjecting into ANOVA. To find out the significance of comparative efficacy of different leaf extract on length, weight and specific growth rate, one way analysis of variance was used. Mean differences of each variable were further analyzed using least significant differences.

Results and Discussion

The growth parameters using plant extracts feed on length, weight, specific growth rate and survival rate of *Oreochromis mossambicus* were described below. The statistical analysis of the data revealed highly significant between the control and different treatments. After 15th, 30th and 45th day of observation, *O.basilicum* supplemented feed showed maximum increase in length (1.20%, 1.60%, 2.00%) and followed by *M.oleifera (*76%, 1.50%, 1.72%) respectively. Regarding weight *M.oleifera* supplemented feed showed increase in weight than the all other treatments of about 0.96%, 1.33%, and 1.78% respectively. Observation on specific growth rate showed that there is an increase in specific growth rate after 15 DAT, and decreased in 30 DAT and 45 DAT (Table–2) *M.oliefera* supplemented feed exhibited maximum SGR of 5.80% (15 DAT), 4.33% (30 DAT) and 3.65% (45 DAT) while control recorded 4.16% (15 DAT), 3.90% (30 DAT) and 3.40% (45 DAT) respectively. Observation on survival rate of 15 (DAT), 30 (DAT) and 45 (DAT) shows that all the treatments exhibited better survival rate of 99.99%. While in treatment of *O.basilicum* supplemented feed recorded 59.99% survival rate respectively.

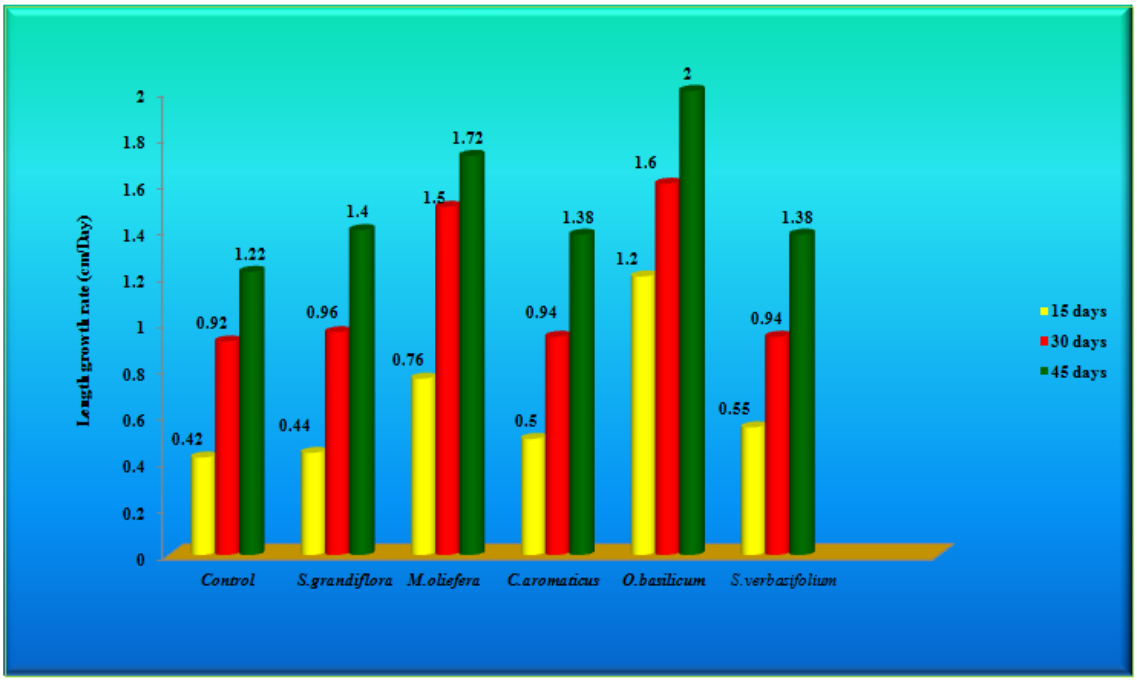
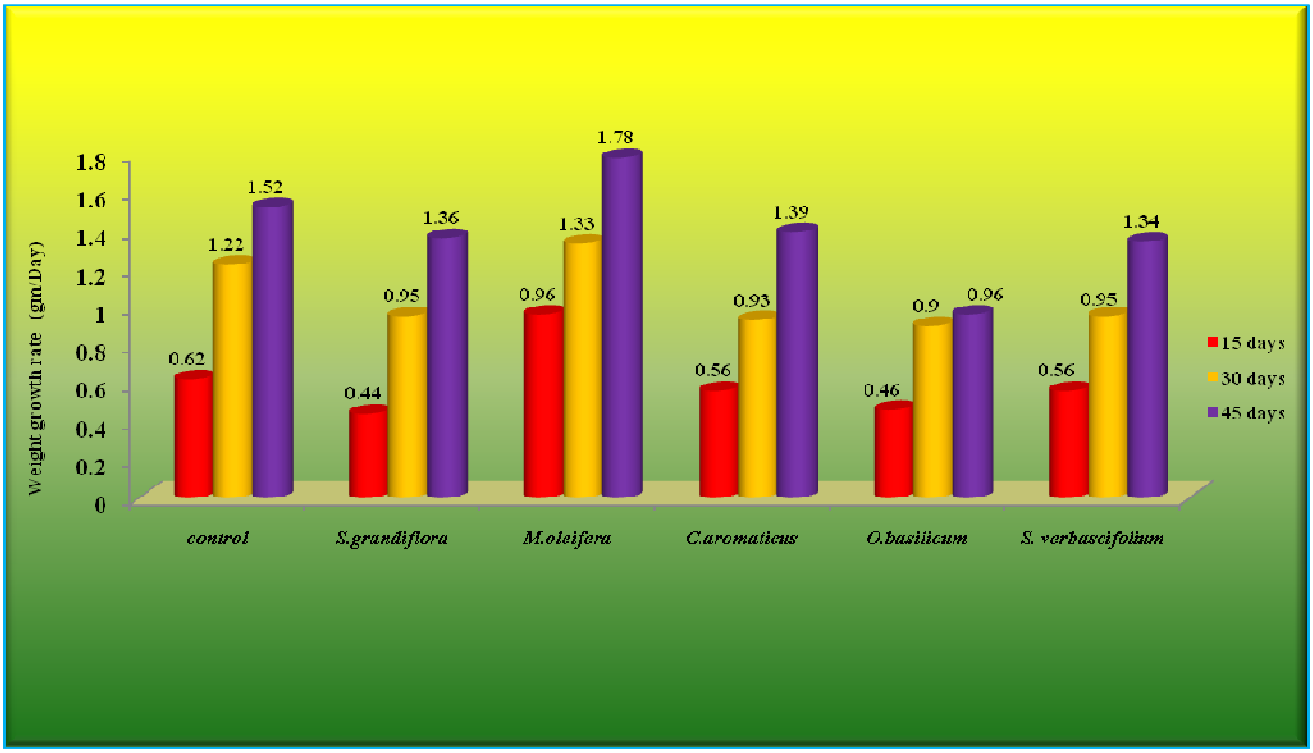


Figure-1
Effect of Supplemented Feed on Length of *Oreochromis Mossambicu*



Figure–2
Effect of Supplemented Feed on Weight of *Oreochromis Mossambicus*

Table-1
Effect of Supplemented Feed on Specific Growth Rate Of*oreochromis Mossambicus*

Treatments	15 days	30 days	45 days
Control	4.16(11.77)b	3.90(11.38)b	3.40(10.62)b
S.grandiflora	2.90(9.80)e	3.02(10.01)c	2.98(9.94)c
M.oleifera	5.80(13.93)a	4.33(12.01)a	3.65(11.01)a
C.aromaticus	3.40(10.62)d	3.05(10.06)c	3.02(10.00)c
O.basilicum	2.20(8.52)f	2.50(9.09)d	2.02(8.17)e
S.verbascifolium	3.73(11.13)c	3.16(10.24)c	2.58(9.24)d
G.M	3.70	3.32	2.94
Sed	51.56	16.83	15.52
CD (0.01)	147.87**	178.25**	2076.69**

Figures in parenthesis are ARC SINE transformed before ANOVA. Means with same letter in each column are not significantly different. Sed – Standard error deviation. CD – Critical Difference.** significant at 1% level

This study indicated that the appetite of hybrid Tilapia is influenced by the concentration of feed attractants. The inclusion of leaf extract in the experimental diet resulted in improvement in body weight gain, length gain and specific growth rate. This result suggests that hybrid Tilapia was chemo reaction as well as olfaction to detect and select its feed. This pattern is similar to that observed by several researchers [8] reported that appetite is a good criterion for testing effectiveness of feed attractants. *Moringa* leaf has been widely studied as an alternative protein source in fish diet and seems to be a promising protein source. *Moringa* leaf can partially replace conventional diets without any depression in growth performance of Nile tilapia (*Oreochromis niloticus*L.)[9]. Tilapia fed with raw moringa leaf meal revealed that 10% of replacement of fishmeal-based dietary protein did not cause any adverse effect on growth performance[10]. *M.oliefera* is well documented world renowned plant herb for its extraordinary nutritional and medicinal properties.

Conclusion

The results on present study indicated the beneficial role of selected plant leaves of *Sesbania grandiflora, Moringa oleifera, Coleus aromaticus, Ocimum basilium* and *Solanum*

verbascifolium as the growth promoters for tilapia fish *Oreochromis mossambicus.* The overall study shows that *Ocimum basilium* at 5% concentration supplemented feed increased the length of the fishes when compared to control. *Moringa oleifera* at 5% concentration supplemented feed showed significant increase in weight and specific growth rate in the fishes than the control. So this study states possibilities of using plant leaves as growth promoters to the fishes in future at farmlevel.

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