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Effects Of *Clitoria Ternatea* Plant Parts on Growth Performance, Biochemical and Enzymatic Activities of Pearl Spot (*Etroplus Suratensis*)

Biotechnology

KEYWORDS : Clitoria ternatea, Etroplus suratensis, Nutritional Indices, Herbals, Digestive Enzymes

V.Uthayakumar	Unit of Aquatic Biotechnology and Live Feed Culture, Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore-641046.
V. Ramasubramanian	Unit of Aquatic Biotechnology and Live Feed Culture, Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore-641046.
P. R. Sreedevi	Unit of Aquatic Biotechnology and Live Feed Culture, Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore-641046.
S. Munirasu	Unit of Aquatic Biotechnology and Live Feed Culture, Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore-641046.
A. Kiruba	Unit of Aquatic Biotechnology and Live Feed Culture, Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore-641046.
D. Senthilkumar	Unit of Aquatic Biotechnology and Live Feed Culture, Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore-641046.

ABSTRACT

In the present study growth promoting, potential of Clitoria ternatea leaves, Flowers, Roots and Seeds the Pearl spot Etroplus suratensis was evaluated. The ingredients basal diet (control) 40% rice flour, 20% Soy bean meal, 10% corn gluten meal, 12% wheat flour, 3% starch -potato starch, and 6% carbohydrate and lipid sources, 5% fish oil, and vitamin and 3% mineral premix. Significant improvements in the nutritional indices, concentrations of biochemical constituents, activities of digestive enzymes. All the statistical values significantly at p<0.05% compared to control. Therefore, these C.ternatia plant parts have considerable potentials in sustainable development of fish E. suratansis Culture.

INTRODUCTION

Aquaculture has become recognized as a growth area of economic importance countries and has attracted the attention of both private and public sectors (Rana, 1997). Recently, growing interest has been paid to the immune stimulating function of medicinal herbs in aquaculture (Uthayakumar *et al.,* 2012) and enhancing growth (Siwicki *et al*., 1989). *C. ternatea* is commonly used in Ayurvedic medicine to treat various types of ailments including as memory enhancer,nootropic, antistress, anxiolytic, antidepressant, anticonvulsant, tranquilizing and sedative agent (Mukherjee *et al*., 2008). Feeds are development either to supplement or to replace natural foods in the culture systems. The extensive aquaculture system mainly depends on natural foods. Food, especially the first formulated food of larvae is vital for achieving good survival rates (Gosh *et al*., 2007). Therefore the aim of the present study was to determine the growth, hematological, biochemical and enzymes activities in *Etroplus suratensis* fed with *Clitoria ternatea* Leaves, Flower, Root and seed formulated diets.

MATERIALS AND METHODS

Fresh leaves of *C. ternatea* were collected from various areas in Bharathiar University, Coimbatore, Tamilnadu, India.. The leaves, flowers, root and seeds were dried in sun light, after which the dried plant parts were ground into fine powder using a grinder. The experimental diets were prepared by mixing1.0% each of powdered *C. ternatea* Leaves, Flower, Root and seed in the basal diet (Harikrishnan *et al*., 2013).The fingerlings of *E. serotonsis* finger lings were obtained from Cauvery River Bhavni, Tamil Nadu, India. Experimental fishes dived into 5 groups for the experimental period fishes were fed with each 1% of *C. ternatea* Leaves, Flowers, Roots and seeds formulated diets for the period of 60 days. The end of the experimental period fish were sacrificed and analyzed Biochemical and enzymes activity of muscle and gut of the fishes.

Figure 1. A *Clitoria ternatea* twiner with Flower

RBC and WBC were counted by haemocytometer method (Rusia and sood, 1992) Hb concentrations were estimated by Cyanmethaemoglobin method (Drabkin,1946) and Hct was determined by the microhematocrit method(Nelson and Morris, 1989) Erythrocyte indices like MCV, MCH and MCHC (Dacie and Lewis (2001). The protein content was estimated by employing Folin-Ciocalteau reagent method of Lowry *et al.* (1951), Carbohydrate was estimated by Roe (1955) and Lipid was estimated by Folch *et al. (*1957) and Amino Acid was estimated by (Moore and Stein, 1948). Protease and lipase enzyme activity was estimated by the method of Furne *et al.,* (2005). Amylase enzyme activity was assayed followed by the method of Bernfeld (1955). Statistical analysis of data was performed by One -Way ANOVA with Duncan test at the level of 95% using SPSS 16(Statistical significance was set at the level of $p < 0.05$ with ± SD).

RESULTS

The intial length and weight of the fish was 1.56± 0.29(cm) and 1.56 ± 0.29(g) in all groups fed with *C.ternatea* seeds was significantly $p<0.05$ after feeding (60 days) in Graphs 1 and 2. A positive effect of *C.ternatea* on the growth was clearly observed in all experimental groups of fishes. Out of this, protein content was found to be high in *C.ternatea* seed fed fishes 45.01±0.08 (µg/ml) followed by amino acid 48.03±1.24 (µg/ml), carbohydrate (4.76±1.43(µg/ml) and lipid 10.76±1.29 (µg/ml) (Table-1). All the statistical values were significantly at $p<0.05$ respectively. At the end of the experimental period high value of gut enzymes

(Lipase, Amylase and Protease) were recorded in *C.ternatea* fed groups than the control. Maximum enzymatic values was found in *C.ternatea* root formulated diets fed *E.suratansis* larval 0.73±0.28 and 3.43±1.00 (U/mg Protein) compare to control (Graph-3). All experimental diet groups show better elevations of *C .ternatea* fed fish gut enzymatic activity mainly high *C.ternatea* roots when compared to control groups significantly at p<0.05 level. The *C.ternatia* fed groups hematological values significantly altered compared to that of control group (Table-2). Highest RBC 0.925±0.01 (million/cu.mm) and WBC 1.417±0.83 (1000/cu.mm) ratio were recorded in *C.ternatea* seeds fed groups, while maximum Haemoglobin 3.67±0.32 (g/dl) and Haematocrit 5.65±1.00 (%) was observed in *C.ternatia* roots and seeds feed groups respectively. At the end of the experimental periods the MCV, MCH and MCHC (324.98±2.43 (fl), 108.23±2.34 (pictograms) and 59.32±1.28 (g/dl) values maximum was observed in C.*ternatea* seed formulated fed group of *E. suratansis.*

Table 1.Changes in hematological parameters of ***E.suratansis*** fed with ***C.ternatea***

Blood Factors	Days	Control	C. ternatea leaves	C.ternatea Flowers	C.ternatea Roots	C.ternatea Seeds
Total RBC (million/cu mm)	0 days	1.81±1.33	1.99±0.87	1.81±1.98	1.88±1.23	2.12±1.87
	30 days	2.38±0.98	2.89±1.54	3.03±0.92	3.32±1.12	4.67±0.96
	60 days	3.65±0.23	4.67±1.01	4.68±2.09	4.54±1.90	5.13±0.32
Total WBC (1000/cu.mm)	0 days	0.61±0.01	0.816±0.04	0.835±0.10	0.830±0.10	0.925±0.01
	30 days	1.21±0.01	1.317±0.21	1.317±0.53	1.333±0.06	1.217±063
	60 days	1.17±0.93	1.193±0.57	1.195±0.82	1.194±0.23	1.417±0.83
Hb (g/dl)	0 days	1.82±0.18	1.89±0.26	1.88±0.32	1.87±0.23	1.87±0.32
	30 days	1.92±0.34	2.68±1.05	2.76±0.43	2.89±0.22	2.90±0.33
	60 days	2.01±0.75	2.69±1.00	3.29±0.98	3.67±0.32	3.43±0.87
Ht (%)	0 days	3.33±0.45	3.34±0.66	3.56±0.62	3.43±1.01	3.34±0.92
	30 days	3.49±0.65	4.67±0.65	4.75±1.00	4.87±0.86	4.77±0.54
	60 days	3.63±0.32	5.12±0.63	5.34±0.65	5.65±1.00	5.34±0.22
MCV (fl)	0 days	205.09±2.32	205.12±1.43	206.32±2.44	204.61±3.43	206.32±2.23
	30 days	214.23±1.98	256.32±2.76	267.09±1.98	265.32±1.54	276.33±1.23
	60 days	232.03±3.21	312.19±2.34	317.32±1.65	313.12±3.22	324.98±2.43
MCH (picograms)	0 days	77.43±2.12	77.25±2.43	77.43±3.43	78.65±2.46	79.98±1.92
	30 days	79.87±1.65	91.12±2.43	92.87±2.43	93.22±1.23	92.39±2.21
	60 days	81.76±2.10	102.01±2.33	105.32±2.43	106.32±2.32	108.23±2.34
MCHC (g/dl)	0 days	33.21±1.65	34.43±1.09	35.65±1.23	36.12±0.34	36.03±1.22
	30 days	35.43±2.1	45.51±1.99	47.21±0.98	46.13±0.63	48.32±1.39
	60 days	37.87±1.23	56.82±1.03	58.32±1.23	57.12±1.23	59.32±1.28

C. ternatea Groups	Protein (µg/ml)		Amino Acid (µg/ml)		Carbohydrate (µg/ml)		**Lipid** (µg/ml)	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control	09.1±0.83	23.2±3.23	13.3±3.76	35.7±1.23	1.1 ±0.39	09.1±1.32	3.9±0.42	6.8±0.23
Leaves	09.2±0.54	43.8±1.03	13.4±0.21	45.2±0.61	1.2±0.43	13.0±1.20	3.0±0.31	9.0±0.19
Flowers	09.8±0.22	44.6± 0.29	14.5±1.32	46.1±0.33	1.4±0.57	13.3±2.47	3.1±0.40	9.1±0.26
Roots	09.8±0.34	45.0±0.08	13.6±0.26	48.0±1.24	1.2±0.29	14.7±1.43	3.1±1.09	9.2±0.34
Seeds	09.3±0.45	47.0±0.17	13.4±1.23	48.9±2.09	1.2±0.67	13.6±1.56	3.4±1.87	10.7±1.29

Table 2.Changes in Biochemical parameters of *E.suratansis* fed with *C.ternatea*

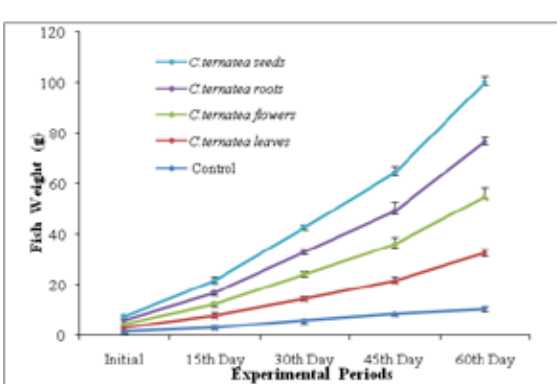

Figure 2. Effect of *C.ternatea* formulated feed fed *E.suratansis* fish weight (g)

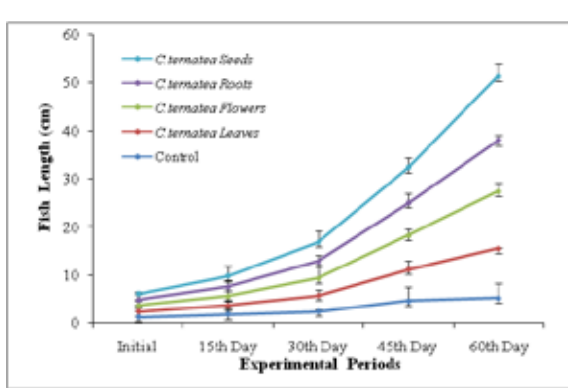

Figure 2. Effect of *C.ternatea* formulated feed fed *E.suratansis* fish length (cm)

DISCUSSION

In the recent years, there is increasing interest in the use of herbals as dietary and therapeutic supplements indicate that growth and modulate immune function in fish and shellfish (Harikrishnan *et al.,* 2011). The results suggest that dietary *C.ternatea* plant parts formulated diets at all concentrations promoted the growth of *E.suratansis* fingerlings. Similar results were reported by Turan (2006) who used the medicinal herb *Trifolium pratense* as a growth-promoting agent for tilapia *O. aureus*. In the present study the hematological parameters were significantly higher (P<0.05) in fish fed diets including *C.ternatea* fed experimental groups . In line with previous study indicated that in *L. rohita* feeding dietary garlic increased number of RBC, WBC, NBT, Hb, Ht and serum bactericidal activity against *A. hydrophila* (Harikrishnan *et al*., 2012).

In this experiment, fish fed diets containing herbals improved the Protein, Amino acids, Carbohydrate and Lipid s. It together with proteins and lipids form dietary sources of energy, and are important in synthesis of chitin, steroid, fatty acids and glycogen (Mukhopadhyay *et al.,* 2003). Similar report was observed in Reduction of total lipid in plasma of *O. niloticus* fed on diets containing high doses of *A.sativum* (Adler and Holub, 1997). In the present study digestive enzymes activity significantly altered in *C.ternatea* roots formulated diets Amylase is secreted by the entire Intestine in the Indian major carps, and its activity is high toward the proximal end (Dhage,1968). There are many reports concerning the monosaccharide-induced protease production. Prakasham *et al.* (2006) reported maximum protease production in xylose and maltose added medium. The present result was also consistent with the above findings. Several herbal principles have been tested for their growth-promoting activity in aquatic animals (Citarasu *et al.,* 2002). Digestive enzyme activity varies with feeding, size, molting stage, environmental stress, and other factors (Lee *et al.,* 1984). Increase in activities of protease, amylase and lipase has also been reported in *P. monodon* PL fed with *Z. officinalis* enriched Artemia (Venkataramalingam, 2007). The present study proved that, the pearl spot, *E. suratensis* was successful candidate to be considered for commercial fish culture. All the parts of *C.ternatea* were proved to enhance the growth of the fish *E.suratensis* and this should be further analysed in other fishes.

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