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Alteration in Length and Weight of *Pungasianodon hypophthalmus* under Extensive, Intensive and Semi-Intensive Culture Practice

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Original Research Article

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Abstract: *Pungasianodon hypophthalmus* is a cat fish. In an effort to promote growth, increase survival and cost associated with fish meal and other majors a comparative study was done under three experiment. Experiment-I was extensive culture practice, experiment-II was intensive culture practice and experiment-III was semi-intensive. The study was conducted for six months. Twenty five fingerlings of Thiapangus were randomly selected from the pool and stocked in each threearthen pond (3.00m×3.00m×2m). In the end of experiment highest weight, length and lowest mortalty(880gm, 35.10cm, 12%) was recorded in experiment-II, lowest length, weight and highest mortality(540.61gm, 29.50cm, 40%) was observed in experiment-I while for experiment-III, it was recorded 698.20gm, 33.48cm, 24%.
Keywords: Pungasianodon hypothalamus, Cat fish, Extensive, Intensive, Semi-intensive

INTRODUCTION

Thai pangus (*Pangasianodo hypophthalmus*) is one of the most popular species in aquaculture Compared to other species in our country[1]. Like other cultivated catfishes, *P. hypophthalmus* is well-known for its faster growth with predatory carnivorous fedding habit, easy culture system, high disease resistance and tolerance of a wide range of environmental parameter[2-4].In India, in rural areas the extensive culture practice widely adopted due to lack of infrastructure and budget. In intensive culture practice fish fed with commercially prepared food and the production of natural food is increased by applying fertilizer. For disease procurement all the possible efforts have to be made to reduce the mortality. The semi-intensive practice is in between the above two kinds and is a transitional stage. Length and weight of an animal is directly associated with allometric and isometric growth. The main aim of this study is comparison between effect of extensive, intensive and extensive majors in relation with body weight, length and mortality of *Pangasianodon hypophthalmus* and correlate the obtained data with other coworkers.

MATERIAL AND METHOD

The juveniles of fresh water fish *Pangasianodon hypophthalmus* with average weight 1.12±0.91gm and total average length 5.10±0.06 were brought from Roorkee, Uttarakhand. MS222 used as sedative(50.00mg/L) for fish transportation. The juveniles were acclimatized for one week in water tank containing 100 Lit. water and fed on commercially prepared feed in the form of pallet but starved for 24 hrs. before the stoking. The experiment was carried for 6 month from May -2017 to October-2017.Three earthen pond (3.00m × 3.00m ×2m) prepared 6 month before the experiment. Twenty five fingerlings were randomly selected from the pool and stocked in each pond for six months. The data was statistically analyzed by graphpad prism 7 software.

Experiment-I(Extensive culture)

In experiment-I,for the growth of planktons fertilizer was not used.500 litre water was filled before introducing the fish in it. The water was changed twice in a month till the end of experiment and water quality parameters was not antained. For disease procurement no safty majors was considered. The fishes was fed with naturaly grown planktons. The detail of zooplanktons and phytoplanktons is given in table-1 and 3.1.

Experiment-II(Intensive culture)

In experiment-II, for the growth of planktons the cow dung was used as fertilizer(500gm).The detail of zooplanktons and phytoplanktons in given table-2. and 3.2.The collection, identification and quantitative analysis of zooplanktons and phytoplanktons was done in end of every month by using standard method[5]. The fishes were fed with naturally grown planktons

along with commercially prepared food twice in day @6,4,3%body weight/day,(Starter, grower and finisher)[6] supplied by Nugen feed and food, Badauli, Karnal, India. The composition and ingredients of commercially prepared food(2-5 mm diameter, 3-5 mm length, Pellets)is given in table-4.All the water quality parameters were maintained throughout the experiment. The water temperature was maintained between 23-30^{0}C by changing the water twice in a month till the end of experiment. Dissolved oxygen level was maintained 7.00-7.50 by artificially aerated automatic air pump. The pH was maintained between 6.50-7.50by changing the water and addition of appropriate amount of calcium carbonate in water. The weight and length of fishes was measured at the end of every month till the end of experiment and shown in table5 and 6.The water of pond was treated with potassium permanganate (antiparasite) 0.5 ppm/Lit (twice in a month).

Experiment-III(Semi-extensive)

In experiment-III, for the growth of planktons the cow dung was used as fertilizer(250gm).The detail of zooplanktons and phytoplanktons in given table-2 and 3.3.Water quality parameters were not monitored and water was changed twice in month. For disease procurement no safty majors was considered. The fishes were fed with naturally grown planktons along with commercially prepared food twice in day @3,2,1.5%body weight/day,(Starter, grower and finisher). The weight and length of fishes was measured in the end of every month till the end of experiment from each experimental setup.

RESULT

Among zooplanktons the group rotifera was found dominant followed by arthropods and protozoans while in experiment-II and III, arthropods mostly crustacean were found dominant. In experiment –I,II and III among phytoplanktons the group chlorophacea was found dominant followed by bacillariophace, cynophacea and euglinophacea. The detail of indentified planktons in experiment –I,II and III is given in table-1 and 2.

Table-1: Showing the zooplankton and phytoplankton of experiment-I.

S.No	Zooplankton	Phytoplankton
1	*Dephniacrinata*(Arthropoda)	*Teraspora*sp.(Chlorophacea)
2	*Nauplius* larvae(Arthropoda)	*Coelastum*sp.(Chlorophacea)
3	Mosquito larvae(Arthopoda)	*Chloralla vulgaris*(Chlorophacea)
4	*Branhionusplicaticis*(Rotifera)	*Chlorallaellipsoida*(Chlorophacea)
5	*Keratellacochlearis* (Rotifera)	*Chlosterium* sp.(Chlorophacea)
6	*Asphachna* sp. (Rotifera)	*Oocystis* sp. (Chlorophacea)
7	*Brachionusangularis*(Rotifera)	*Spyrogyra* sp.(Chlorophacea)
8	*Paramecium caudatum*(Protozoa)	*Ulothrixsp.*(Chlorophacea)
9	*Amoeba* sp. (Protozoa)	*Stichococcus* sp.(Chlorophacea)
10	-	*Cyclotella* sp.(Bacillariophycea
11	-	*Anabaena* sp.(Cyanophycea)
12	-	*Euglena*sp.(Euglenophycea)

Table-2: Showing the zooplankton and phytoplankton of experiment-II and III

S.No	Zooplankton	Phytoplankton
1	*Dephniacrinata*(Arthropoda)	*Teraspora* (Chlorophacea)
2	Nauplius larvae(Arthropoda)	*Coelastum*(Chlorophacea)
3	Mosquito larvae(Arthopoda)	*Chloralla vulgaris*(Chlorophacea)
4	*Cyclops* (Arthropoda)	*Chlorallaellipsoida*(Chlorophacea
5	*Moina* sp.(Arthropoda)	*Chlosterium* sp.(Chlorophacea)
6	*Calanusplumchrus*(Arthropoda)	*Oocystissp.*(Chlorophacea)
7	*Branhionusplicaticis*(Rotifera)	*Spyrogyra*sp.(Chlorophacea)
8	*Branchionusrubens*(Rotifera	*Gonathogygon*sp.(Chlorophacea)
9	*Keratellacochlearis* (Rotifera)	*Pleurococus* sp.(Chlorophacea)
10	*Asphachna(*Rotifera)	*Tetrahedron*sp.(Chlorophacea)
11	*Paramecium caudatum*(Protozoa)	*Crucigeniairregularis(Chlorophacea)*
12	*Amoeba* sp. (Protozoa)	*Pediastrum simplex*(Chlorophacea)
13	*Aurcelladiscoides(Protozoa)*	*Cyclotella sp.(Bacillariophycea)*
14	*Vorticella companula(Protozoa)*	*Navicula* sp.(Bacillariophycea)
15	-	*Surirela* sp. (Bacillariophycea)
16	-	*Fragilaria* sp. (Bacillariophycea)
17	-	*Anabaena*(Cyanophycea)
18	-	*Gomphospaeria*(Cyanophycea)
19	-	*Euglena* (Euglenophycea)
20	-	*Phacus*(Euglenophycea)

Highest quantity of planktons was observed in experiment-II while lowest quantity was observed in experiment-I. Monthly variation in quantity of planktons is given table-3.1,3.2 and 3.3 and figure-1,2 and 3 .Increased weight and length was observed in eperiment-II(intensive) and III(semi-intensive)throughout the experiment when compared with experiment-I(extensive). In the end of experiment the highest weight and length was recorded(880.00gm,35.10cm) in experiment-II followed by experiment-III(698.20 gm, 33.48 cm). In experiment-I it was recorded lowest(540.61gm, 29.50cm.The total mortality of experiment–I, in experiment-II and III was recorded 40%,12% and 24%.The montly weight, length and mortality of *Pangasianodon hypophthalmus* is given in table 5 and 6 and figure-4 and 5.

Table-3.1:Monthlymean value of planktons(×10^3 cell/L)of experiment-I.

Plankton group	Month						Mean
	May	June	July	August	September	October	
Chlorophacea	9.12	6.30	6.16	5.98	5.48	5.12	6.36
Bacillariophacea	6.16	5.78	5.60	4.90	4.63	4.41	5.24
Cynophacea	5.28	5.10	5.02	4.76	4.60	4.54	4.88
Euglinophacea	1.02	0.98	0.86	0.80	0.76	0.70	0.85
Total phytoplanktons	21.58	18.16	17.64	16.44	15.47	14.77	17.34
Rotifers	3.27	2.68	2.81	2.89	2.80	2.60	2.84
Arthropods	0.29	0.42	0.21	0.22	0.20	0.17	0.25
Protozoa	0.10	0.15	0.13	0.12	0.10	0.09	0.10
Tatalzooplaktons	3.66	3.25	3.15	3.23	3.10	2.86	3.20
Total planktons	25.24	21.41	20.79	19.67	18.57	17.63	20.54

Table-3.2:Monthly mean value of planktons(×10^3 cell/L) of experiment-II

Plankton group	Month						Mean
	May	June	July	August	September	October	
Chlorophacea	15.16	12.25	11.76	11.21	11.13	11.80	12.21
Bacillariophacea	8.26	8.09	7.80	7.62	7.41	7.38	7.76
Cynophacea	7.48	6.24	5.86	5.42	5.36	5.29	7.13
Euglinophacea	1.46	1.22	1.10	1.02	0.97	0.90	1.11
Total phytoplanktons	32.36	27.80	26.52	25.27	24.67	25.37	28.21
Arthropoda	6.50	6.22	6.34	6.42	6.37	6.28	5.28
Rotifers	4.80	4.26	4.36	4.68	4.60	4.22	4.48
Protozoa	0.82	0.84	0.80	0.78	0.74	0.68	0.77
Total zooplanktons	12.12	11.32	11.50	11.88	11.71	11.18	11.61
Taotal Planktons	44.36	39.12	38.02	37.15	36.38	36.55	39.82

Table-3.3:Monthly mean value of planktons(×10^3 cell/L) of experiment-III.

Plankton group	Month						Mean
	May	June	July	August	September	October	
Chlorophacea	11.10	8.41	9.16	9.11	10.08	10.30	9.69
Bacillariophacea	7.20	6.72	6.58	5.52	5.68	5.59	6.21
Cynophacea	5.88	5.20	5.10	5.08	4.93	4.87	5.17
Euglinophacea	1.08	1.02	0.98	0.92	0.87	0.80	0.94
Total phytoplanktons	25.26	21.35	21.82	20.63	21.56	21.56	22.01
Arthropoda	4.54	4.31	4.14	4.10	4.05	4.01	4.19
Rotifers	3.72	3.66	3.52	3.45	3.35	3.30	3.50
Protozoa	0.63	0.65	0.60	0.54	0.52	0.48	0.57
Total zooplanktons	8.89	8.43	8.26	8.09	7.92	7.79	8.26
Taotal Planktons	34.15	29.78	30.08	28.72	29.48	29.05	30.27

Table-4:Compositionand ingredients of commercially prepared food for experiment-II and -III.

S.No	Name of ions/vitamins substances	Amount/%	S.No	Name of ions/vitamins substances	Amount %
1	Protein, minimum	12%	10	Selenium	0.60-0.61ppm
2	Fat, minimum	5.50%	11	Vitamin E, minimum	225.00IU/lb
3	Fibre, maximum	23.00%	12	Vitamin A, minimum	3500.00 IU/lb
4	Lysine, minimum	0.70%	13	Biotin, minimum	3.60mg/lb
5	Calcium	0.8-1.00%	14	Starch, maximum	7.00%
6	Phosphorus minimum	0.50%	15	Sugar, maximum	4.00%
7	Magnesium minimum	0.50%	16	Ferrous Carbonate	QS
8	Zinc minimum	220.00ppm	17	Manganous Oxide	QS
9	Copper minimum	65.00ppm	18	Cod liver oil	1%

INGREDIENTS

Alfalfa, Shredded Beet Pulp, Wheat Midlings, Ground Oat Hulls, Ground Soy Hulls, Ground Flaxseed, Soy Oil, Calcium Lignin Sulfonate, Calcium Carbonate, Mono-dicalcium Phosphate, Salt, Vitamin A, Natural falvour, Vitamin C, Biotin, B-12 Concentrate, Calcium Pentothenate, Choline Chloride, Natural Vitamin E, Tecopherols, Vitamin D,L-Lysine, Magnesium Oxide, DL- Methionine, Niacin, Riboflavin, Selenium, Thiamine, Cobalt Carbonate, Copper Sulphate, Manganous Oxide, Calcium Iodate, Zinc-Oxide.

Note- The amount of feed for experiment-III was given half of experiment-II.

Table-5: Monthly variation in body weight(gm) of *P. hypophthalmus* in Experiment-I, II and III

Months	Experiment-I	Experiment-II	Experiment-III	No.ofdeat and mortality% Exp.-I	Exp.-II	Exp.III
May	25.10±3.10	35.12±2.12	30.42±2.24	4=16%	2=8%	3=12%
June	70.10±4.22	95.21±5.00	81.61±3.10	3=12%	1=4%	2=8%
July	120.21±5.42	180.00±4.00	165.40±3.50	2=8%	-	1=4%
August	205.41±4.60	351.22±7.60	314.21±7.30	1=4%	-	-
September	334.20±6.81	702.00±8.20	630.65±7.57	-	-	-
October	540.61±6.20	880.12±10.50	698.20±8.50	-	-	-

All values are mean of remaining live fishes and ±is SEM.

Table-6: Monthly variation in body length (cm) of *P. hypophthalmus* in Experiment-I,II and III

Months	Experiment-I	Experiment-II	Experiment-III
May	4.65±0.15	4.96±0.10	4.87±0.16
June	7.90±0.20	10.43±0.25	8.96±0.26
July	17.82±0.26	20.36±0.22	18.10±0.20
August	26.88±0.40	30.10±0.42	28.60±0.43
September	28.68±0.38	33.20±0.35	31.81±0.32
October	29.50±0.50	35.10±0.52	33.48±0.48

All vaues are mean of remaining live fishes and ±is SEM.

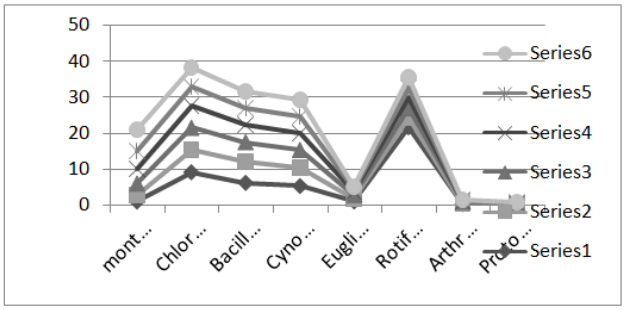

Fig-1: Showing monthly quantitative variation (×10^3 cell/L)in planktons in experiment-I.

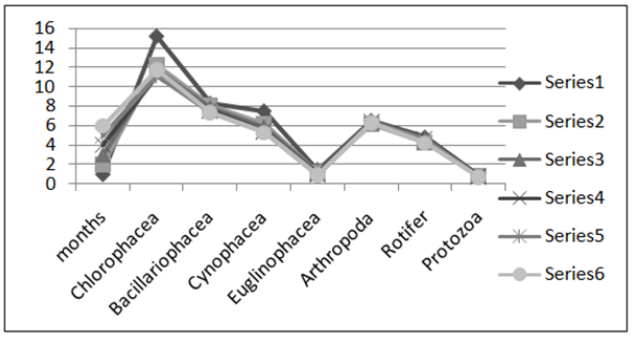

Fig-2: Showing monthly quantitative variation (×10^3 cell/L)in planktons in experiment-II.

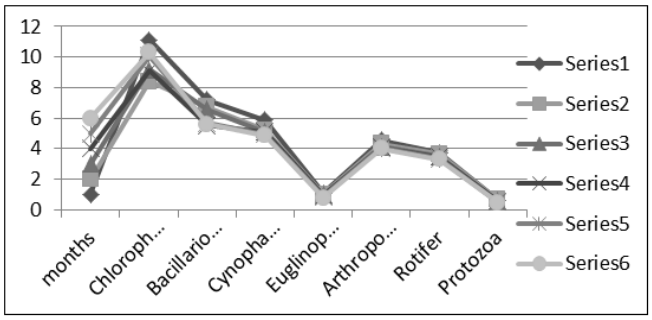

Fig-3: Showing monthly quantitative variation (×10^3 cell/L)in planktons in experiment-III.

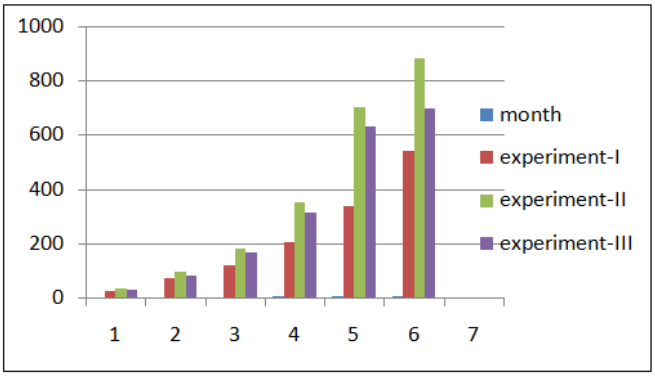

Fig-4: Showing monthly variation in weight(gm) in *Pangasianodon hypophthalmus* experiment-I,II and III.

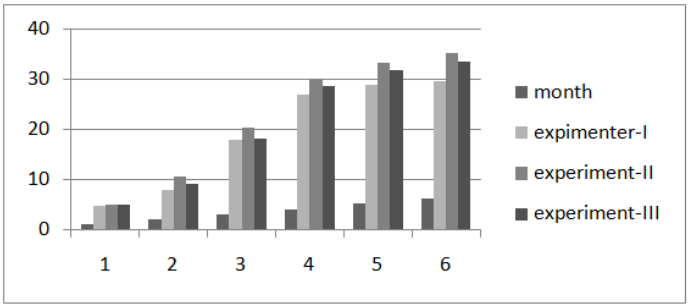

Fig-5: Showing monthly variation in length (gm) in *Pangasianodon hypophthalmus* experiment-I,II and III.

DISCUSSION

In experiment-II the highest weight, length lowest mortality was recorded for Thipangus throught the experiment because they were fed with commercially prepared nutrient rich diet. The quantity of zooplanktons and phytoplanktons was also high because the pond was treated with cow dung for the growth of planktons. The water quality parameters was

also controlled between the normal range[7], for disease control the potassium permengnate was used as an antiparasites. In experiment-III moderate weight and length and mortality was recorded throughout the experiment because the experimental fishes was fed moderately with commercially prepared feed and the pond was also treated moderately with cow dung for the growth of plankton as a result the moderate quantity of planktons was available for fish. In experiment-I the lowest weight, length highest mortality was observed because the Thipangus were totally depended on naturally grown planktons and the quantity of planktons was recorded lowest because the pond was not treated with fertilizers for the growth of planktons so that improper supply of nutrient remained throughout the experiment[8,9]because deficiency of nutrients is directly associated with allometric growth of animals[10]. Simultaneously the water quality parameters mainly dissolved oxygen and pH was not monitored, no disease procurement was considered as a result the lowest weight, length and highest mortality was recorded due to environmental stress.

CONCLUSION

In the present study the variation in weight, length and mortality in fish *Pungsianodon hypophthalmus* suggested that intensive fish farming is profitable for fish farmers. Semi-extensive fish farming is less frofitable than intensive while extensive fish farming is cheap but time consuming and always risky and some time gives very less profit.

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