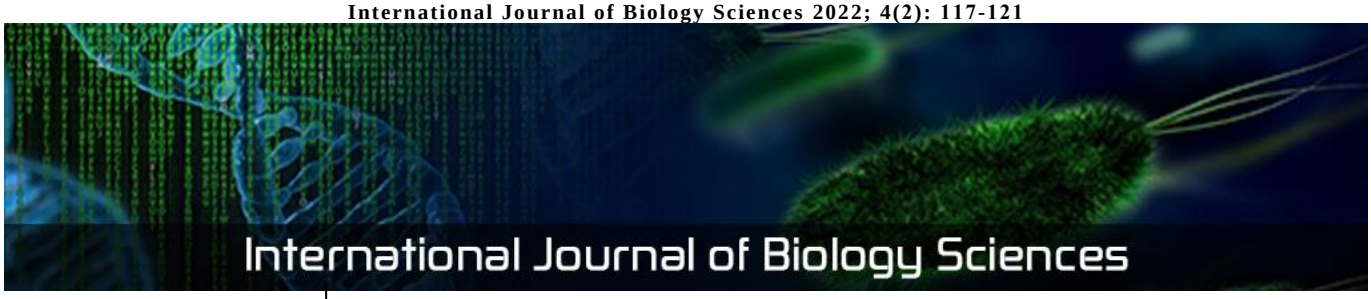

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To study the effects of various artificial feed on growth rate of *Carassius carassius* (Gold Fish)

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Abstract
Present work was done with keeping view of the key concept as evaluation of growth pattern by feed management in gold fish with reference to physico-chemical parameters. Firstly, fish fingerlings were bought from market shop namely fish and fun Bhopal Madhya Pradesh. Fingerlings were then installed in aquarium, thereafter we started feeding fishes with experimental feed. All the three fishes of gold fish were almost uniform in size and weight. The fishes show better growth in experimental feed formed of soybean, Rice bran, Egg shell, Curry leaves, Moringa leaves, and chicken liver etc. fishes also show positive growth in experimental feed. The feeding of fishes fluctuate from the disturbance of any physio-chemical parameters of water, especially Temperature, pH and dissolved oxygen.

Keywords: Gold fish, feed, growth rate, water parameter

Introduction
Nutrition is one of the key factors in improving production efficiency of ornamental fish. The other factors include growth, health, body color and breeding of these fishes. Nutritional requirements and feed management needs in ornamental fish are determined mainly based on the information of these and the experiences of successful aquarist in the line. Fish feed is the most expensive input during aquaculture operations. The high cost of feed arises from extensive reliance on animal protein sources, such as fishmeal and shrimp meal (Omoregie, 2001) [13]. Shortage and high cost of pelleted feed severely constrains the development of low cost aquaculture systems suitable especially for small-scale farmers. Therefore, there is a need to assess the potential of non-conventional raw ingredients before use in fish diets. Good nutrition in animal production systems is essential to economically produce a healthy and high quality product. According to Omoregie and Ogbemudia (1993) [14], fish nutrition has advanced dramatically in recent years with the development of balanced commercial diets for promoting optimal fish growth and health. However, as the cost of fish production continue to escalate due to soaring feed prices owing to extensive use of expensive animal protein like fish meal, aquaculture production becomes a less or non-profitable enterprise (El-Sayed, 2006) [4]. Therefore, it is necessary to explore utilization of plant proteins in fish feeds as substitutes for expensive animal protein materials (Omoregie and Ogbemudia, 1993) [14]. Fish meal has become the most essential protein for commercial aquaculture feeds. It provides the fish with high quality protein, an essential amino acid profile and has high palatability (Li *et al.*, 2006) [9]. As fish meal is expensive and inaccessible to small scale fish farmers, there is a need of replacing fish meal with cheaper ingredients (Higgs *et al*., 1995) [7]. Plant proteins are likely candidates because of local availability and low cost (Lim and Webster, 2006). Substituting fishmeal with plant protein ingredients can reduce the fish growth (Francis *et al*., 2001) [6]. Despite its associated challenge, the current study, aims at evaluating the nutritional potential of plant ingredients. Cassava (*Manihot esculenta*, Crantz) contains 27.39-30.8% protein content. As an all – season crop as food in several parts of Africa (Nigeria inclusive), Asia and Latin America is well documented (Longe, 1980; Rosling, 1987; Bradbury *et al.*, 1991) [10, 16, 1]. Besides protein, it contains minerals, Vitamin B1, B2, C and carotenes (Eggum, 1970; Adewusi and Bradbury, 1993) [3].
Colocasia contains 30.0-33.5% protein content. It is widely produced throughout the world for its underground corms (Njintang *et al.*, 2007) [11]. The nutritional value is the main concern when a crop is being considered as a food source. Due to the emphasis placed on the nutritional value of food by consumers, a great need exists for information on the nutritional contents of root crops (Huang, *et al.*, 2007).

Starch is the most important component (73-80%) of taro (Njintang *et al.*, 2007) [11]. It contains about 11% protein on a dry weight basis. This is more than yam, cassava or sweet potato. The protein fraction is rich in essential amino acids of trionine, leucine, arganine, valine and phnylalanine. Among the essential amino acids methionine, lycine, cystine, phnylalanine and leucine are relatively abundant in the leaf than the corm (FAO, 1999) [5].

Sweet potato contains 29.18-35.3% protein content. Among other root and tuber crops, contains higher contents of carbohydrates, various vitamins, minerals, and protein than other vegetables (Shih *et al.*, 2007) [17].

Materials and Methods

Measurement of physico-chemical water parameters during research period viz Temperature, pH, and dissolved oxygen etcwas done by with the help of HQ 40D made by HACH company, this meter can measure a lot of parameters of water. The data of fishes length and weight was taken from at 10 days interval, total measurement was done eight times. I observed increase in both weight of fishes. The feeding of fishes two times in a day with 3% of body weight, feed was given in the form of pellet. Measurement of weight was done with the with electronic weight and length of fishes taken from scale. Wastes are siphoned out by siphoning and water of the aquarium was exchanged 25% every seventh day. Water sources was the tape water.

S. No.	Aquarium accessories	Feed Ingrident	Tank factors considered
1.	Aquarium of 24×12×12	Rice bran	Tank size
2.	Tables and stands	Soya bean seed pest	Tank Shape
3.	Thermocol sheet	Egg shell	Number of fish
4.	Pipes	Curry leaves powder	Fish size and growth
5.	Air stones/aerator	Moringa leaves powder	
6.	Filter	Chicken lever	
7.	Gravel	Company feed	
8.	Hand net	Egg yolk	
9.	Baked /mug	Fish meal	
10.	Aquarium fish	Crab meal	
11.	Fish food	Pea nut pest	
12.	Water testing kit	Corn pest	
13.	Feed ingredients	Wheat flour	
		milk powder	
		cucumber	

Goldfish (*Carassius carassius)* belongs to the family Cyprinidae of order Cypriniformes. Goldfish is primarily a freshwater fish regarded to be one of the most popular pet fishes of the world. Goldfish tends to measure average 12" inches in length. Body colour of goldfish is combinations of white, yellow, orange, red, brown, and black are known. Different sources claim maximum recorded sizes anywhere from 19 inches to 23 inches with a maximum weight of 4.5 kg. Goldfish are long lived fish with a reported expectancy of 5-10 years in captivity. Goldfish can vary greatly in size, body shape, fin configuration and coloration due to intensive selective breeding.

Linnaeus 1758 Discovered this amazing ornamental gold fish. It's a cold water fish. Maximum length of 23inc. (59cm).Maximum weight of 9.9 (4.5kg). Live more than 20 year. Generally only lives six to eight year.

The present investigation was carried out in the laboratory in Hatchery section of "Department of Zoology and Applied Aquaculture, Barkatullah University" where experimental aquariums were set up and the necessary requirements were facilitated.

Materials

Step used for feed preperation

For present study feed was prepared through following feed preparation methods. all these methods are as:

Collection of material

For feed preparation the plants feed ingredients such as Soyabean, Egg shell, curry leaves, Moringa leaves and chicken liver and rice bran were brought from local market Bagsweniya.

Drying of ingredients

Ingredients of all the feed were dried to get rid from moisture. All ingredients were dried in open sun for 2-10 days.

Crushing and grinding

All feed ingredients, ingredients were crushed and grinded separately for pellets formation

Mixing of ingredients with binder

All the crushed and grinded ingredient was mixed with binder (Rice bran). Similarly commercial feed ingredients were mixed with binder. Coconut oil was added while mixing constantly and 85ml of water per 100gm of feed was slowly blended into mixer resulting in suitability texture dough as for fish feed.

Fermentation

The all the dough was then kept in autoclave for 20 minutes to remove the fungal attack or to make fungal free.

Pellet formation

The dough was inserted into pellet machines and through this pellet having size 1mm was made. The pellets were kept in incubator for 24 hours to dry the feed.

Packing of feed

The pellets were then packed in tight polythene and kept in room by maintaining 28^{o}c temperature.

Method

(*Carassius carassius)* fingerlings were purchased from shop namely fish and fun in the city of Bhopal. They were brought to the laboratory through the inflated polythene bags filled with aerated water. The circular tough was used washed with potassium permanganate to make free from fungal attack. They were kept in circular trough to acclimatize to the laboratory condition for two days. The excreta and excess feed were siphoned out daily to avoid contamination the water had pH ranges between 7.0 to 8.5. Feeding was stopped one day before the fish were used for experiment. The healthy fish and uniform size and weight were selected for experiment. 6 fish were taken in a glass aquarium. Aquarium fish were fed on experimental feed (30%) protein for the first 30 days of the experiment and remaining 30 days fishes were fed on commercial feed.

Experiment design and setup

Glass aquarium with 15 litres water holding capacity was used for the experimental studies. The acclimatized *Carassius Carassius* fingerlings of almost uniform size and weight were randomly distributed in the aquarium. Fishes were fed on experimental diet for the first 20 days of the experiment, and remaining 10 days fishes were fed on commercial feed. Sources of water for aquarium were tap water. All fish were fed daily twice a day at 11 am and 5:30 pm. The fingerlings were fed 5% live wet body weight twice a day. The aquarium water was partially renewed daily. The fish were weighted after 10 days and feeding rates adjust accordingly. The uneaten feed was siphoned out daily after 6 hours of feeding.

Diet formulation and preparation

The experiment was set up for 60 days from 25 September to 25 November (2016) in department of zoology and applied aquaculture. During experiment two experimental diets were selected. shown in table consisted of ingredients soya beans, rice bran, wheat, curry leaves and Moringa leaves were brought. Consisted of (30%) crude protein ingredients consist of rice bran and cod liver oil were brought from local market. By using all the feed preparation steps experimental feed were prepared. All the experimental diets ingredients were mixed with binder by using water separately.

Feed formulation method

Two types of feed was prepared in the present experiment which were scientifically formulated considering the specific nutritional need of *Poeciliasphenops* (30-40%) protein for the proper judgement of growth and survivability rate in this experiment by Pearson square methods. Pearson square method or box method of balancing rations is a simple procedure that has been used for many years. Diets are formulated to fulfil the energy, protein and energy protein ratio of the diets. If protein and energy contents of diets are satisfied then other nutrients are automatically augmented. However, marginal supplements of the nutrients is required, if necessary. Different mathematical techniques are used to balance the nutrients contents of diets. in present study Pearson square method was used to prepare balance diet.

Results and Discussion

Table 1: Experimental feed chart and the observations

Experimental feed number	No. of fish	According to body weight feed in fish (gm per day)		Fish weight		SGR	FCR	Weight gain in %	Diet Content
		Morning	Evening	Initial	Final	(gm)	(gm)		
1	3	1.205	1.205	40.18	40.81	2.1	0.63	1.568	Company feed/Standard
2	3	1.105	1.105	36.86	40.18	11.1	0.33	9	Plant material mix egg shell & chicken liver
3	3	1.278	1.278	42.6	44.34	5.8	0.73	4.08	Animal protein

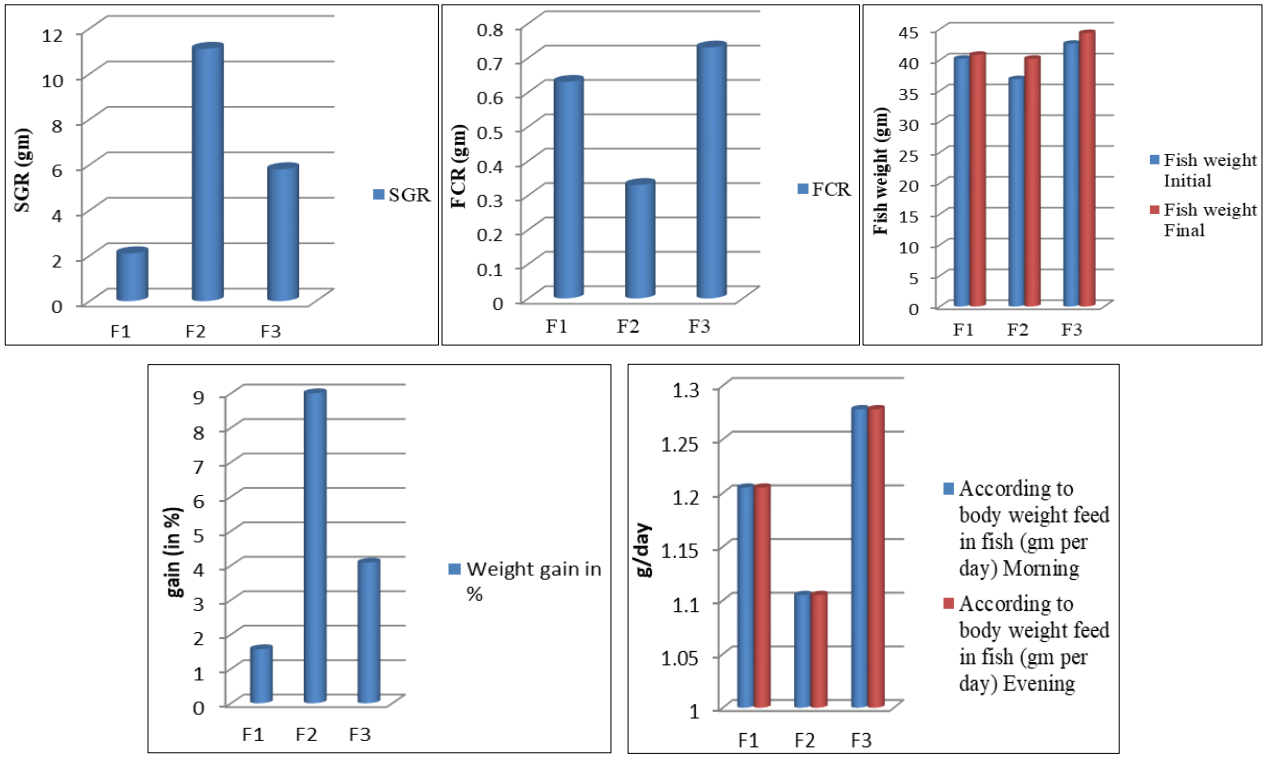

Fig 1: Experimental Feed Number

A.) Physico-chemical observations

The physico-chemical analysis for the parameters like temperature, pH, high pH NO3, NO2 NH3 and was carried out for Aquarium 1separately.

The result of physico-chemical parameters investigated during the study period are given in the tables below.

Week	Temperature (°C)	D.O (mg)	pH	High pH	NO3 (ppm)	NO2 ppm)	NH3 (ppm)
1st	27	6.7	7.7	7.8	1	0.25	0.5
2nd	28	6.9	7.8	8.2	5	2	8
3rd	26	7.1	7.3	7.4	0.25	0	0.25
4th	24	7	7.6	7.7	0.25	0	0.24
5th	23	7.2	7.3	7.4	0.27	0.5	0.25
6th	24	7.4	7.7	7.8	0.25	0	0.23
7th	21	7.3	7.5	7.7	0.23	0.2	0.25
8th	22	7.6	7.2	7.3	0.22	0	0.21
9th	21	7.5	7	7.1	0.2	0	0.19

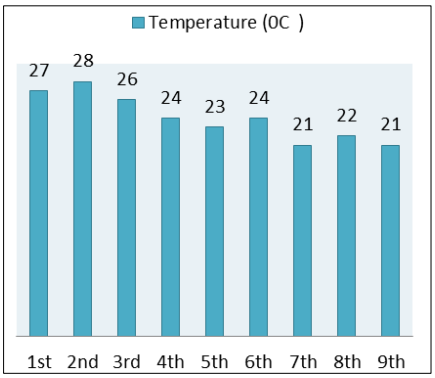

Fig 2: Temperature (°C)

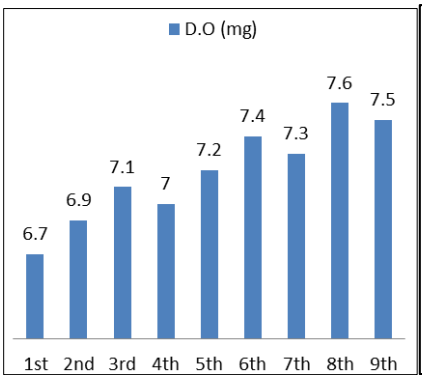

Fig 3: D.O (mg)

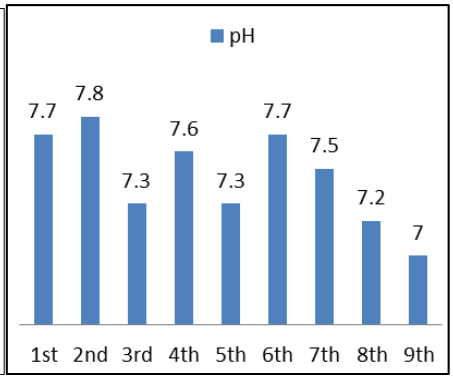

Fig 4: pH

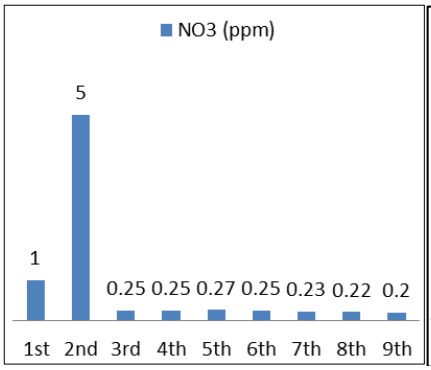

Fig 5: NO_3 (ppm)

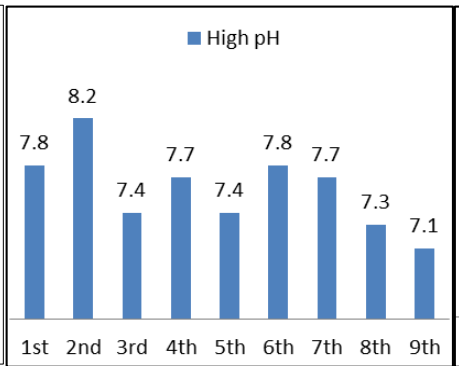

Fig 6: High pH

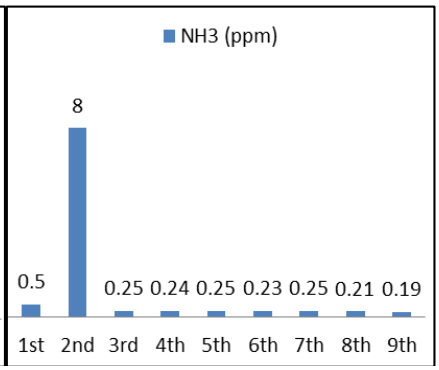

Fig 7: NH_3 (ppm)

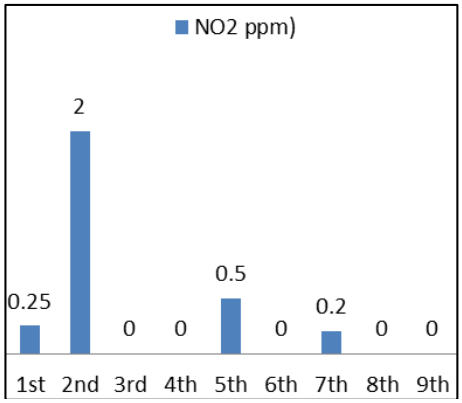

Fig 8: (NO_2 ppm)

Conclusion

Months research work concluded that fishes showed good growth performance in experimental feed as compared to commercial feed gold fish an ornamental fish having omnivores feeding nature. Feeding of fishes fluctuate from the disturbance of any physico-chemical parameters of water, especially temperature, pH and dissolved oxygen.

The success of a commercial aquaculture enterprise depends on providing the optimum environment for rapid growth at the minimum cost of resources and capital. One of the major of intensive recirculation systems is the ability to manage the aquatic environment and critical water quality parameters to optimize fish health and growth rates. Although the aquatic environment is a complex eco-system consisting of multiple water quality variables, it is fortunate that only a few of these parameters play decisive roles. These critical parameters are temperature, suspended solids, pH, and concentration of dissolved oxygen, ammonia, nitrite nitrate. Each individual parameter is important, but it is the

aggregate and interrelationship of all the parameters that influence the health and growth rate of the fish.

References

1. Bradbury JH, Egan SM, Lynch MJ. Analysis of cyanide in cassava using acid hydrolysis of cyanogenic glucosides. J Sci. Food Agri. 1991;55:277-290.
2. Edwards P, Allan GL. Feed and Feeding for inland aquaculture in Mekong region countries. ICIAR Technical Report. 1991;56:1-37.
3. Eggum RO. The protein quality of cassava leaves. Br. J Nutr. 1970;24:761-768.
4. El-Sayed AFM. Tilapia Culture. CABI Publishers, Oxfordshire, UK, 277. reared in cold water. Aquaculture. 2006;269:414-426.
5. FAO. Taro Cultivation in Asia and the Pacific, Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, 1999.
6. Francis G, Makkah HPS, Becker K. Anti-nutritional factors present in plant-derived alternate fish feed ingredients and their effects in fish. Aquaculture. 2001;199:197-227.
7. Higgs DA, Dosanji BS, Prendergast AF, Beams AF, Hardy RW, Riley W, *et al*. Nutrition and Utilization Technology in Aquaculture. Chapman and Hall Company. New York. USA, 1995, 130-156
8. Huang AS, Tanudjaja LS. Application of anion exchange high-performance liquid chromatography in determining oxalates in taro (*Colocasia esculenta* (L.) Schott) corms. Journal of Agriculture and Food Chemistry. 1992;40:2123–2126.
9. Li MH, Peterson BC, Jones CL, Robinson EH. Comparison on diet containing various fish meal levels on growth performance, body composition and Insulin-like growth factor -I of Juvenile channel catfish, (*Ictalurus punctatus*) of different strains. Aquaculture. 2006;253:628-635.
10. Longe OG. Effect of processing on the chemical composition and energy value of cassava. Nutr. Rept. Inter. 1980;21:819-829.
11. Njintang NY, Mbofung MF, Kesteloot R. Multivariate analysis of the effect of drying method and particle size of flour on the instrumental texture characteristics of paste made from two varieties of taro flour. Journal of Food Engineering. 2007;81:250–256.
12. Olele NF. Comparative study on the use natural and artificial based diet on *Clarias gariepinus* fingerings. Journal of Agriculture and Biological, Science. 2001;6:9-13.
13. Omoregie E. Utilization and nutrient digestibility of mango seeds and palm kernel meal by juvenile Labeo senegalensis (Antheriniformes: Cyprinidae). Aquaculture. Research. 2001;32:681-687.
14. Omoregie E, Ogbemudia FI. Effect of substituting fishmeal with palm kernel on growth and food utilization of the Nile Tilapia, (*Oreochromis niloticus*). Israeli J. Aquacult. 1993;43:113-119.
15. Polsen RA, Spencer DSC. The technology adoption process in subsistence agriculture: The case for cassava in Southwestern Nig. Agri. Sys. 1991;36:65-78.
16. Rosling H. Cassava toxicity and food security. Tryck Kontakt, Uppsala, 1987.
17. Shih PH, Yeh CT, Yen GC. Anthocyanins Induce the Activation of Phase II Enzymes through the Antioxidant Response Element Pathway against Oxidative Stress Induced Apoptosis. Journal of Agricultural and Food Chemistry. 2007;55:9427-9435.