International Journal of Zoology Studies
ISSN: 2455-7269
Impact Factor: RJIF 5.14
www.zoologyjournals.com
Volume 3; Issue 2; March 2018; Page No. 171-174

Studies on length-weight relationship of exotic fishes and their Gastrosomatic index from Bansagar Colony Pond, Rewa (M.P.)

Shweta Mishra
Research Scholar (Zoology) - Govt. Science College Rewa, Madhya Pradesh, India

Abstract
Present paper deals studies on Length-weight relationship of exotic fishes and their gastrosomatic index from Bansagar Colony pond from Nov. 2012 to Oct. 2013. The data of length and weight of required fishes were collected on monthly basis, using standard method given in literatures. After the collection of length-weight data of, *Ctenopharyngodon idella, Cyprinus carpio* (Lin.), *Hypophthalmichthys molitrix* (val.) *Tilapia mossambica* (Pet) following observations were derived. Gastrosomatic index is concerned the minimum value 2.19 for *Cyprinus carpio* and maximum value 6.03, while in case of *silver carp* Gastrosomatic index was calculated minimum 3.08 and maximum 15.82, in Tilapia minimum value was 6.91 and maximum was 14.50.

Keywords: length-weight relationship, *Cyprinus carpio*, bansagar colony pond and GSI

1. Introduction
India is the third largest producer of fish in the world next only to China and Peru and it ranks second in the production of Inland fishes. Fish production has increased from 0.75 million tons in 1950 to 6.90 million tons in 2006-2007, registering a compound growth rate of 4.53% per annum which has been the fastest growing one in respect of any item in the food sector.

Fresh water science is the study of inland waters it is often regarded as a division of ecology or environmental science, it covers the biological, chemical, physical, geological and other attributes of all inland water (running and standing).

The age of fish is interpreted with scales present on the lateral line of fish. Environmental conditions play an important in the determining growth patterns in fish.

Age composition of the catch often has been used different fisheries of the world to predict the future available stocks, so knowledge of length weight of fishes has various biological use. Age, length, and weight are closely related to each other. The estimation of length is a key to estimation of weight and age etc.

The length of fish has been converted to weight of fish. Extensive semi intensive and intensive culture of many indigenous and exotic carps of various food habits are being done by using fertilizers and supplementary foods. By employing these methods, maximum fish production can be obtained in limited time from the water bodies.

Simultaneous culture of species of different feeding habits and habitat performs in one pond or aquatic body is known as polyculture in India the credit for applying scientific approach to polyculture goes to Alikunhi (1957) [1]. Firstly Indian carp were cultured together and later on exotic carp fishes were reared with common carp.

The three Indian major carp, namely catla (*Catla catla*), rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigala*) contribute the bulk of production of over 3.02 million tonnes (FAO, 2006) [2]; followed by silver carp, grass carp and common carp forming a second important group.

An alien species is defined as one that has been translocated, accidentally or deliberately, beyond its natural distribution range.

Exotic species have primarily been introduced into new ecosystem through human activities either deliberately or intentionally (Gozlan *et al*. 2010) [3]. It is known that the great bulk of global fish introductions and translocation have been carried out for aquaculture purpose (De Silva 2003) [4].

Important exotic fishes introduced in India for sport, food and mosquito controls are game fishes, food fishes larvicidial fishes etc. But keeping this view of fish production common carp (*Cyprinus carpio*), silver carp (*Hypoptholmichthys molitrix*), Tilapia and Grass carp (*Ctenopharyngodon idella*) etc. are cultured under the polycultured. Introduction of non-native fishes can reduce diversity and modify local community dynamics in fresh water ecosystem (Minns and Cooley 2000) [5] so native fish assemblages can be greatly reduced (Rahel 2000 and Jackson 2002) [6-7] and food web function can disturbed (Vander zander *et al.*, 1999) [8], resulting in possible deter mental effects on native species or even on ecosystem functioning (Gozlan *et al.* 2010) [3].

For the studying of exotic fish fauna of Rewa district, selected water bodies were visited at a regular interval to collect the specimens. The collection work was done with the help of local persons and fishermen. The experimental fishing was also done whenever required. In spite of collection work, several valuable information regarding the fishery was also recorded. Collected specimens were preserved in the 8% formalien for further study.

Water play an important role in development programmes of country they can serve as sources of drinking water and water for industries, for agriculture power development and fisheries unfortunately human settlement and industrial development effluents pollution in various water system. Most of the fresh

water resources in recent years are rapidly destroy due to intense human activities and loading of pollutants.

2. Material and Methods

In order to study the food and feeding habits of common carp, sample were collected from the commercial catcher during fishing year Nov. 2012 to Oct. 2013 at Bansagar Colony Pond, Rewa.

The coefficient of correlation 'r' can be calculated using the following.

$$r = \frac{\sum xy - n\bar{x}\bar{y}}{\sqrt{[(\sum x^2 - n\bar{x}^2)(\sum y^2 - n\bar{y}^2)]}} r$$

All the fish specimens were weighed separately and then gutted for the collection of gut contents and preserved in 5% formalin. The collected guts were weighed and their content emptied in the watch glass. To find out the feeding rhythm of *Cyprinus carpio, Ctenopharyngodon idella, Hypophthalmichthys molitrix and Tillapia mossambica* Gastro-somatic index (GSI) was calculated using the fallowing formula (Desai, 1970) [9].

$$\text{GaSI (\%)} = \frac{\text{Weight of gut (g)}}{\text{Total weigh of fish (g)}} \times 100$$

3. Result and Discussion

The length-weight relationship of different fishes has been studied by several ichthyologists in several places. But so far no work has been attempted on this aspect in the water bodies around Bansagar colony Pond, Rewa. Hence, three water bodies of different ecological nature of this region were selected for above study.

For the purpose of length-weight relationship, regular monthly observation was made from November 2012 to October 2013. During the study period, with the help of fishing parties and local fishermen. The data of length and weight of required fishes were collected on monthly basis, using standard method given in literatures. After the collection of length-weight data of, *Ctenopharyngodon idella, Cyprinus carpio* (Lin.), *Hypophthalmichthys molitrix* (val.) *Tilapia mossambica* (Pet) following observations were derived.

Cyprinus carpio - In the case of Bansagar colony pond, total 243 specimens were observed. During the observation mean minimum length 32.00 cm. and maximum 64.00 cm. were recorded. The weight of fishes varies from 442.00 to 3600 g. When the data of length and weight are computed the value of growth coefficient 'b' 2.886 was found. The value of 'a'= -1.685 and the value of r = 0.97 are calculated for the *cyprinus carpio* of Bansagar colony pond (Table 1, Fig. 1).

Ctenopharyngodon idella - During the study of Bansagar colony pond grass carp were absent.

Hypophthalmichthys molitrix – In the case of Bansagar colony pond 84 specimens were examined which ranged from 15.08 to 82.04 cm. in length and 77.05 to 7514.08 by weight. When the mean values of length and weight were transformed into log value the least linear regression provided the value of a = -1.886, b = 3.018 and r = 0.98 (Table 1 & Fig. 2).

Tilapia mossambica – Bansagar colony pond, 364 specimens of different length and weight were observed which ranged from 14.52 to 18.18 cm. in length and 34.44 to 108.34 by weight. When the mean values of length and weight were transformed into log value the least linear regression provided the value of a = -2.080, b = 3.243 and r = 0.84 (Table 1 & Fig. 3).

Table 1: Descriptive statistics estimated parameters of length–weight relationship at Bansagar Colony pond, Rewa from November 2012 to Oct 2013.

Species	Number examined	Length range (cm.)		Weight range (g.)		Parameters of length weight relationship		
		Min	Max.	Min.	Max.	'a' value	'b' value	'r' value
Cyprinus carpio	614	32.00	64.00	442.00	3600	-1.685	2.886	0.97
Ctenopharyngodon idella	-	-	-	-	-	-	-	-
Hypophthalmichthys molitrix	84	15.08	82.04	77.05	7514.08	-1.886	3.018	0.98
Tilapia mossambica	364	14.52	18.18	34.44	108.34	-2.080	3.243	0.84

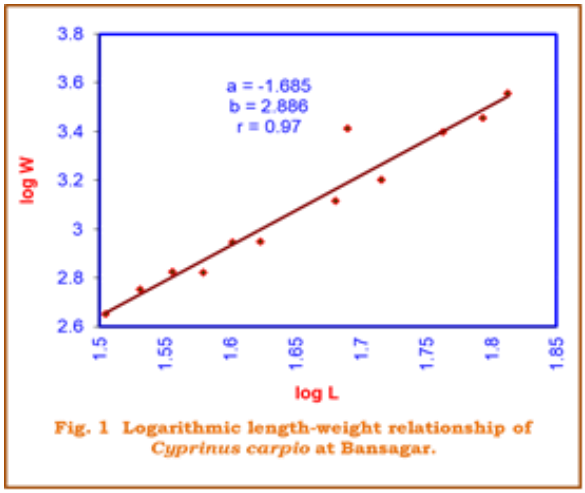

Fig. 1 Logarithmic length-weight relationship of *Cyprinus carpio* at Bansagar.

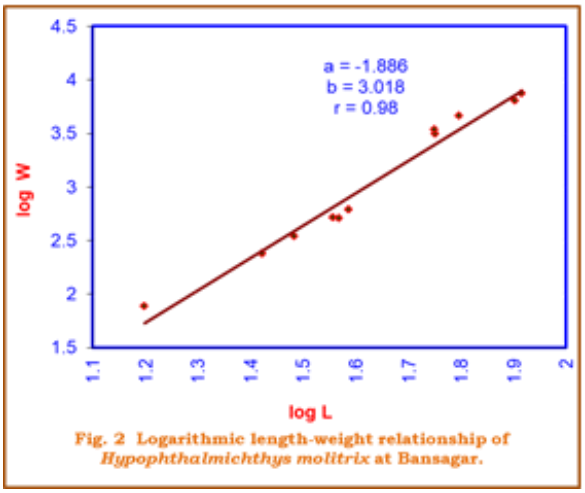

Fig. 2 Logarithmic length-weight relationship of *Hypophthalmichthys molitrix* at Bansagar.

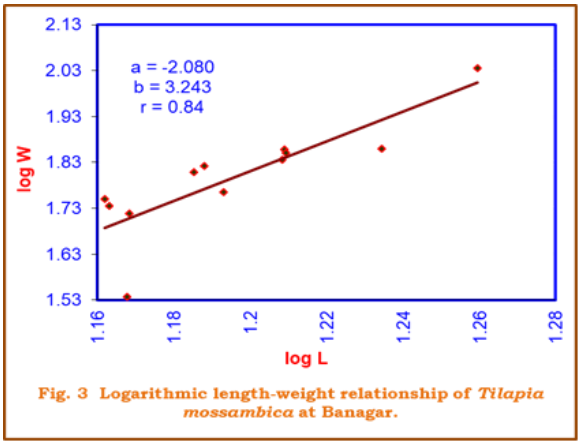

Fig. 3 Logarithmic length-weight relationship of *Tilapia mossambica* at Banagar.

Gastro somatic Index (GaSI)

For the analysis of quantitative feeding of common carp, grass carp, silver carp, tilapia, gastro somatic index was calculated. During the study period monthly collected specimens were brought to the laboratory and length weight of each fish was recorded after that, the stomach was dissected out and weighed with and without contents. The gastro somatic indices were comparatively minimum in the month of July and maximum in month of may for *Cyprinus carpio*, and for grass carp it was minimum in rainy season and maximum in summer, when Gastrosomatic index were calculate in silver carp it was minimum in rainy and maximum in summer for tilapia GSI was fluctuate with different months. (table 2)

Table 2: Mean values of Gastrosomatic Index of Bansagar colony, Rewa from Nov. 2012 to Oct. 2013

Months	*Cyprinus carpio*	*Grass carp*	*Silver carp*	*Tilapia*
Nov	4.48		7.64	12.78
Dec	3.90		10.11	10.86
Jan	4.24		9.15	8.48
Feb	2.89		9.66	10.28
Mar	3.49		8.88	7.13
April	5.32		15.82	13.82
May	6.03		10.65	13.72
June	5.51		11.39	14.50
July	2.19		11.31	14.10
Aug	2.69		3.08	13.79
Sep	3.14		3.32	13.96
Oct	3.76		10.38	6.91
Max.	6.03		15.82	14.50
Min.	2.19		3.08	6.91
Seasonal variations				
Winter	3.88		9.14	10.60
Summer	5.09		11.69	12.29
Rainy	2.95		7.02	12.19

Gastrosomatic index is concerned the minimum value 2.19 for *Cyprinus carpio* and maximum value 6.03, while in case of silver carp Gastrosomatic index was calculated minimum 3.08 and maximum 15.82, in Tilapia minimum value was 6.91 and maximum was 14.50 (Table 2).

Every organism on earth requires energy for growth, reproduction and other metabolic activities. These life sustainable processes take place utilizing food energy. Hence, food is considered as the most essential component for the growth of all living organisms. Fishes like any other organisms depends on the energy received from its food to perform its biological processes. Food consumption is the major factor controlling fish production. Information on the natural food of fish is important in understanding its nutritional requirements, its interaction with other organisms and its potential use for aquaculture (Royce, 1987) [10].

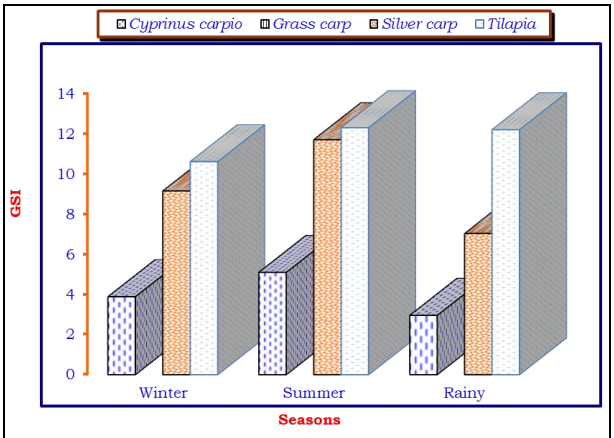

Fig. 4 Seasonal variations of Gastrosomatic Index of Bansagar colony, Rewa from Nov. 2012 to Oct. 2013

Quantitative assessment of food items and feeding habits in fishes is an important aspect of fisheries management and the study of food and feeding habits of fishes can shed light on the behaviour, habitat use and energy intake of various fish species and inter / intra specific interactions that occur in aquatic ecosystems (Walters, *et al.*, 1997) [11].

Once the food preference of a species is ascertained, an evaluation of its trophic relationship such as overlapping of food spectrum with other coexisting species, competition from other species, selectivity or flexibility in feeding on the food items etc, can be made. Different feeding habits and food preferences would be the likely outcomes of potential use of artificial diets and their compositional adjustment aimed at achieving improved results (Sabapathy and Teo, 1993 and Deguara *et al*., 2003) [12, 13].

For transboundary inland water ecosystems, regional country cooperation is essential for effective invasive exotic species management strategies as efficiency can be increased by sharing information, ensuring consistency in related policies, legislation and practice, and cooperation on risk assessments. Identification of invasive exotic species and pathways of entry that are of concern to two or more countries and determination of priorities for multi-lateral cooperation is an important step towards harmonization. Information exchange on national standards and regulatory frameworks regarding aquatic invasive exotic species is crucial to identify gaps and share lessons learned.

Unfortunately, most existing controllable pathways for Exotic species are managed largely with the objective of controlling unwanted disease, pathogens and parasites (i.e., for "quarantine" purposes), and invariably for crops or livestock which are themselves exotic. Such mechanisms rarely involve consideration of the potential impacts of the primary organisms being moved. They also tend to focus on economic impacts and not impacts upon native biodiversity. They do, however, represent a substantial network of expertise and capacity onto which broader-based biodiversity considerations can be built. In addition, many countries, including most developing countries, have poor infrastructure for controlling movements, even for "quarantine" related services and effectively porous borders for movements of invasive exotic species.

4. Acknowledgement

The author is thankful to the Authorities of Govt. P.G. Science College, Rewa (M.P.) for their valuable suggestions and support.

5. References

1. Alikunhi KH. Fish culture in India. Fm. Bull, *Indian Coun. Agr. Res*. 1957; 20:101-144.
2. FAO (Food and Agriculture Organization). State of world aquaculture. FAO *Fish Tech* Pap, 2006, 500.
3. Gozlan RE, Britton JR, Cowx I, Copp GH. Current understanding on non-native Freshwater introductions. Journal of Fish Biology. 2010; 76:751-796.
4. De Silva SS. Culture-based fisheries: an underutilized opportunity in aquaculture development. *Aquaculture*. 2003; 221(1):221-243.
5. Minns CK, Cooley JM. Intentional introductions: Are the incalculable risks worth it? In Nonindigenous freshwater organisms. Lewis Publishers, New York, 2000, pp. 57-60.
6. Rahel FJ. Homogenization of fish faunas across the United States. Science (Washington, D.C.). 2000; 288:854-856.
7. Jackson DA. Ecological effects of Micropterus introductions: the dark side of black bass. Am. Fish. Soc. Symp. 2002; 31:221-232.
8. Vander Zanden J, Casselman J, Rasmussen J. Stable isotope evidence for the food web consequences of species invasions in lakes. Nature (London). 1999; 401:464-467.
9. Desai VR. Studies on the fishery and biology of *Tor tor* (Himilton) from river Narmada. J.Inland Fish. Soc. India. 1970; 2:101-112.
10. Royce WF. (ed.). Fishery development. New York, Academic Press, 1987, 248p.
11. Walters C, Christensen V, Pauly D. Structuring dynamic models of exploited ecosystems from trophic massbalance assessments. Review in Fish Biology and Fisheries. 1997; 7(2):139-172.
12. Sabapathy U, Teo LH. A quantitative study of some digestive enzymes in the rabbit fish, *Siganus canaliculatus*, and the sea bass, Lates calcarifer. J Fish Biol. 1993; 42:595-602.
13. Deguara S, Jauncey K, Agius C. Enzyme activities and pH variations in the digestive tract of Gilthead Sea bream. J Fish Biol. 2003; 62:1033-1043.