

# Variation in Carbohydrate Content in the Fish *Clarias Batrachus* at Three Different Sites on River Ganga

**Dr. Ravindra Singh**

Associate Professor, Department of Zoology, K.B.P.G College Mirzapur, U.P., India

## Abstract

Fish can be considered ‘the poor man’s animal food’ (Kent, 1997) and, for large population, fish is an irreplaceable animal source of food. Evaluation of the Carbohydrate contents of food fish is one of the most important aspects in the fish nutrition. The present study was carried out to determine the Carbohydrate content in the fish *Clarias batrachus* in the river Ganga at three sampling sites viz. Allahabad, Vindhyachal and Mirzapur in high and low flow seasons. Carbohydrate content was found to be highest in Allahabad in low flow and high flow as well.

**Keywords:** Carbohydrate, *Clarias batrachus*, Gangariver.

## I. INTRODUCTION

Carbohydrate refers specifically to the nitrogen free extract portion of a feed which is physiologically digestible; the amount in a food is assigned an energy value of 4.0 kcal g<sup>-1</sup> (Hastings, 1979). The global consumption of fish and derived fish products has greatly increased during recent decades (Wim *et al.*, 2007). Change in consumer trend could be based on a number of distinct factors; foremost among these is the growing knowledge that fish constitute an important and healthy part of the human diet but also to the presence of vitamins, minerals etc., with a high biological value. Consequently, it is a well-known fact that fish represent a high-quality nutritional source (Sidhu, 2003). Fish demand is also increasing as a result of the increasing world population, higher living standards and the good overall image of fish among consumers (Cahu *et al.*, 2004). Fish as a whole has a lot of food potential and can therefore be expected to provide relief from malnutrition, especially in developing countries (Ashraf *et al.*, 2011). In addition to the fact that, fish flesh is tasty and highly digestible; it also minimizes the risk of heart diseases and increases life expectancy (Ashraf *et al.*, 2011). Proximate composition is used as an indicator of fish quality; it varies with diet, feed rate, genetic strain and age (Austreng and Refstie, 1979). A few quantitative studies have also indicated that body constituents and energy resources vary with seasonal life cycles (Puwastien *et al.*, 1999).

## II. REVIEW OF LITERATURE

Carbohydrates are the cheapest sources of food energy but they are not all equally well utilized by all animals. Carbohydrate was of limited usefulness in trout diets (Phillips *et al.*, 1948) and large amounts of starch in the diets decrease the digestion of protein (Kitamikado *et al.*, 1965). When digestible carbohydrate is consumed in excess of energy requirements, it builds up into visceral fat deposits and fatty

infiltration in organs eventually restricting normal body function (Phillips, 1969; Hastings, 1979). However, Chinook salmon tolerated relatively high levels of dietary carbohydrates (Buhler and Halver, 1961) and eels showed faster growth when fed on high percentage of carbohydrate (30%) than those fed on high percentage of protein (Degani, 1987). Tiemeier *et al.* (1965) found a sparing action of carbohydrate on Protein when fed to Channel catfish and the sparing action was greater when diets contained relatively lower levels of carbohydrate than diets having higher carbohydrate levels (Dupree, 1969). The available literature reveals that there are differences in the ability of fish species in using carbohydrate in their diets.

### III. OBJECTIVES OF THE STUDY

The fish *Clarias batrachus* is a food fish in India and easily available in fresh water, so keeping this point in view the present study is being proposed. sampling sites A (Allahabad) from the global position 29°29'07.98"N 77°59'44.07"E, B (Mirzapur) from the global position 28°49'21.42"N 78°09'04.23"E and C (Vindhyachal) ) from the global position 28°45'35.58"N 78°08'38.15"E. It would be an asset for a rational fish culturist to formulate an artificial diet with a maximum level of carbohydrates without retarding or hampering fish growth and the present work was aimed to find such a level of carbohydrate for *Clarias batrachus*.

### IV. MATERIALS AND METHODS

Fishing was done during late night with the help of professional local fisherman. Gill nets (Patti) about 40 feet long and 6 feet wide with cork line at the top rope and metal line with ground rope made locally of nylon were used for fishing as fish gear. Four fishermen with the help of 2 wooden boats usually operated a single patti. Motor driven boats were not used, as the fish would be disturbed with the sound from engine. Fishing was done 3 times starting from the month of February 2007 to December 2012. Fishes were dissected, livers were taken out washed with distilled water examined for any visible defect and shifted to marked sterilized polythene bags. A portion of each of fish kidney and gills were also dissected out, washed with distilled water, and shifted to properly marked sterilized polythene bags. Polythene bags having fish parts were then stored in freezer (at -20°C) for further analysis. The percentage of proximate composition of the fish samples were determined by conventional method of Association of Official Analytical Chemists. [AOAC(2000)]. Triplicate determinations were carried out on each analysis.

**Carbohydrate or NFE (Nitrogen Free Extract)** Carbohydrate (NFE) was calculated as following:

Carbohydrate (%) = 100 - (Protein + Fat + Ash + Fibre)

### V. RESULT

The Carbohydrate content (Nitrogen free extract) (%) in all the samples of fish analysed was in the range of

21.87 to 25.26 % with a mean value  $22.5 \pm 0.570$  % in low flow samples and  $24.3 \pm 0.603$  % in high flow samples at Allahabad (Sampling Site-A) (Fig.1). The Carbohydrate content (Nitrogen free extract) (%) in all the samples of fish analysed was in the range of 21.85 to 24.23

% with a mean value  $22.4 \pm 0.576$  % in low flow samples and  $23.9 \pm 0.426$  % in high flow samples at Vindhyachal (Sampling Site-B) (Fig.2). The Carbohydrate content (Nitrogen free extract) (%) in all the samples of fish analysed was in the range of 21.27 to

24.36 % with a mean value  $22.5 \pm 0.530$  % in low flow samples and  $23.4 \pm 0.132$  % in high flow samples

Mirzapur (Sampling Site-C) ( Fig.3).

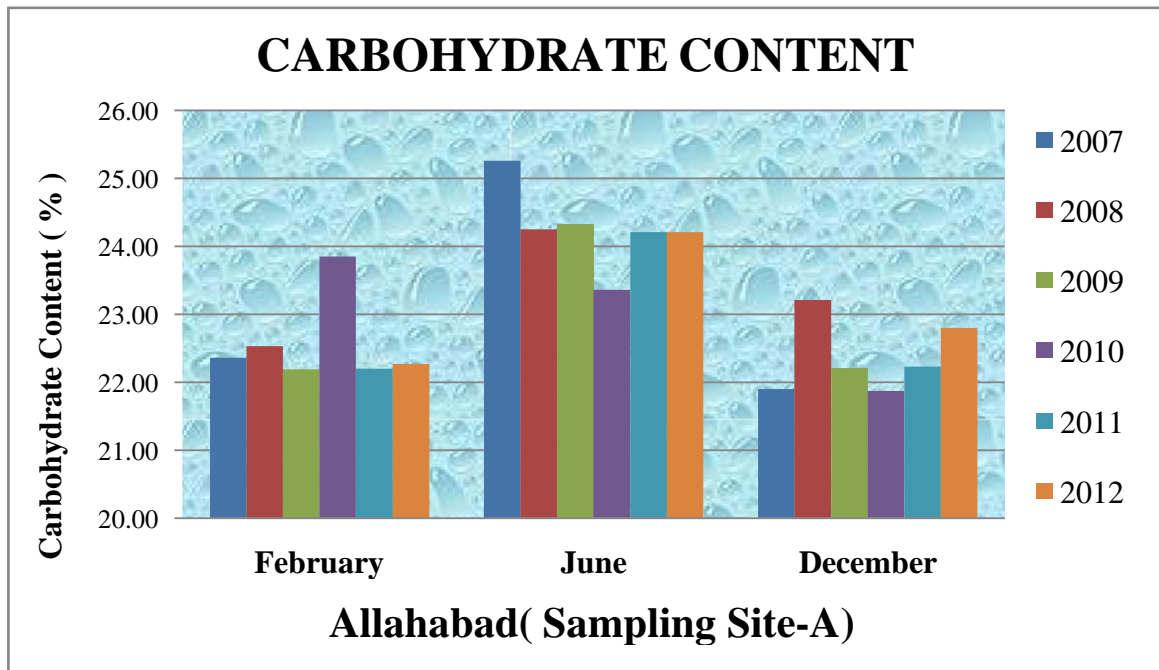


Figure 1: Carbohydrate content (%) in the fish *Clarias batrachus* at Allahabad (Sampling Site-A) in February, June and December from 2007 to 2012 in high and low flow.

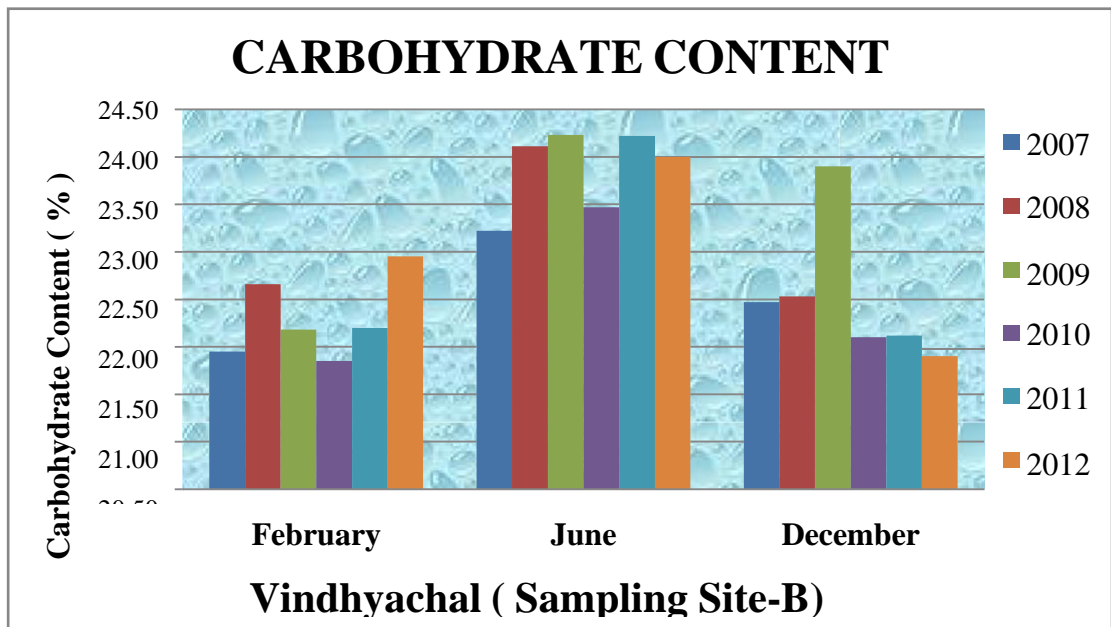
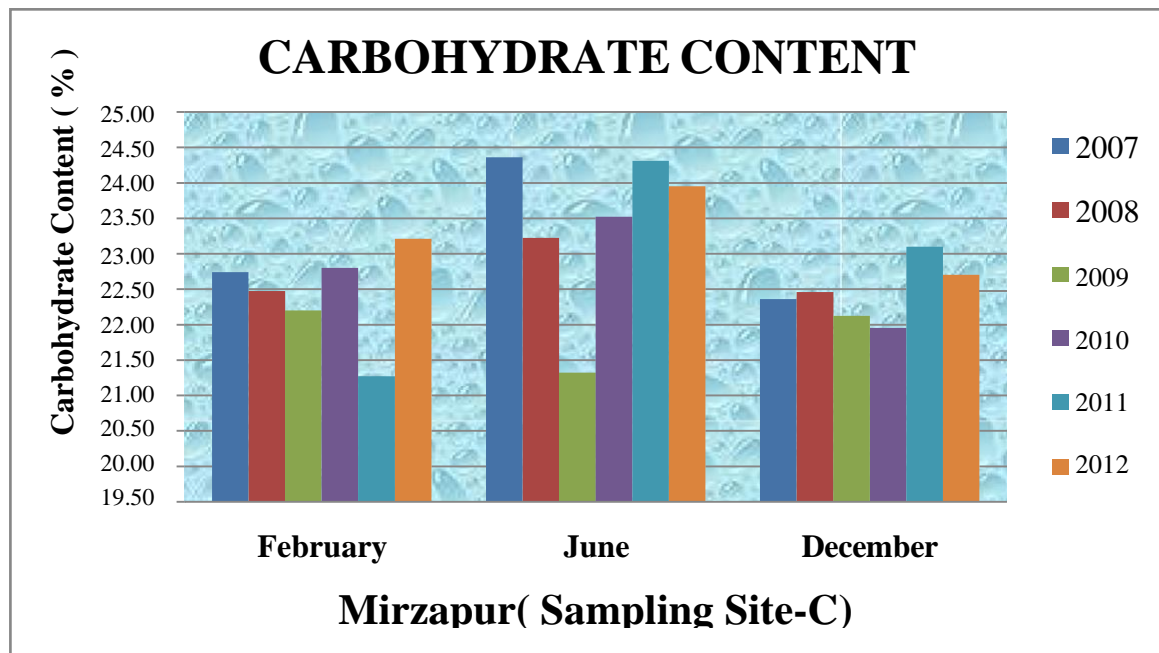


Figure 2: Carbohydrate content (%) in the fish *Clarias batrachus* at Vindhyachal (Sampling Site-B) in February, June and December from 2007 to 2012 in high and low flow.



**Figure 3: Carbohydrate content (%) in the fish *Clarias batrachus* at Mirzapur (Sampling Site-C) in February, June and December from 2007 to 2012 in high and low flow**

## VI. DISCUSSION

Fish has been suggested to be a useful key component for a healthy diet in humans (Ackman RG., 1980). The Carbohydrate content in the samples of Allahabad were found to be with a mean value of  $22.5 \pm 0.570$  % in low flow samples and  $24.3 \pm 0.603$  % in high flow, at Vindhyaachal was found to be with a mean value of  $22.4 \pm 0.576$  % in low flow samples and  $23.9 \pm 0.426$  % in high flow, and at Mirzapur it was found to be with a mean value of  $22.5 \pm 0.530$  % in low flow samples and  $23.4 \pm 0.132$  % in high flow samples. The result of the analysis shows that the carbohydrate content was high at the time of low flow and low at the time of high flow.

The result also shows slight decline during high flow in between the three sites i. e.,  $24.3 \pm 0.603$  in A,  $23.9 \pm 0.426$  in B and  $23.4 \pm 0.132$  in C. Though the changes are minimal but they might show that during the high flow seasons the river banks spread and capture nearby agriculture fields which are rich in fertilizers & pesticides as they are used frequently, thus polluting the river and affecting the fish health (Gopal, K. and Agarwal, A. K., 2003), and they might be the indicators of increasing pollution from site A to B and from B to C in high flow seasons.

## VI. CONCLUSION

From the present study it can be concluded that due to its nutritive properties, easy availability in this area and due to affordable price, the fish *Clarias batrachus* is an ideal dietetic food for human beings as all the dietary components are present in adequate quantity.

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