Asian Journal of Fisheries and Aquatic Research

Volume 20, Issue 4, Page 35-43, 2022; Article no.AJFAR.93835
ISSN: 2582-3760

Food Composition and Feeding Intensity of *Channa Striata* from Selected Stations of River Krishna, Andhra Pradesh

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJFAR/2022/v20i4503

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/93835

Original Research Article

Received: 12/09/2022
Accepted: 17/11/2022
Published: 26/11/2022

ABSTRACT

Aim of the current piece of work was to study the food composition and feeding intensity of *Channa striata* from Krishna river from June, 2019 to July 2020. The gut contents were analysed from the three stations to undertaken the food composition of the fish. The major components of food items in the gut of fish was: fishes and their larvae, crustaceans, insect larvae, annelids with semi digested material and unidentified items. Fishes are identified as of teleost, particularly carps and cat fish larvae but most of the fishes leftovers could not be recognized since they are found in advanced phases of digestion with only scales & skeleton remains. Gastropods are identified as polycheate larvae, and Crustaceans are prawn and crab larvae. The percentage occurrence of fishes and their larvae in gut contents and also feeding intensity were indicated that *C. striata* preferential food was fishes followed by crustaceans.

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Keywords: Channa striata; food composition and feeding intensity.

1. INTRODUCTION

Murrels belonging to family channidae are predatory air-breathing fishes well distributed in Asian continent and African countries [1]. This family was the most economic food fish among the local market with traditionally identified pharmacological benefits with wound healing and in boosting energy of the disease persons particularly *Channa striata*. The Channa has highest species diversity with 46 valid species [2]. Nearly 22 species of *Channa* have been described from India, out of which 19 sps are found in the Eastern Himalayan region [2]. Food and feeding habits of fishes from various environments has shown that the requirements at different stages in lifecycle required different type of food organisms [3]. It is very important in fishery biology as it relates to various activities of the fish like shoaling behaviors and even entire fishery [4]. Feeding biology is a significant feature of the life history phases of fish species [5]. Food quality and occurrence is the major factor controlling fish production [6]. The food and their quality of fishes may influence number of factors such as region, zones species, size and behavior) and thus information on food of fishes is an important to understand the basic functioning of fish assemblages [7,8]. The concept of critical feeding season has been found to be valuable in information of recruitment of wild fish population [9] and also an understanding of how the various fish species utilize available food resources [10,11].

Fishes are directly depend upon their surrounding aquatic environment for food and also proper utilization of the readily available food organisms [12]. Krishna et al., [13], reported food spectrum and analysis of Indian shad *Rastrelliger kanagurta* from Visakhapatnam coast and the fish omnivores feeder. The omnivore fishes which fed on one or more assemblies of animals, i.e., plankton, benthos [11]. The knowledge of the food quality and feeding intensity of fish helps in distribution fish through survey for successful management of a fishery and such studies are undoubtedly important in any fisher's research program [13]. The food composition and feeding intensity of *Channa striata* in Krishna River is really scanty. Therefore, the results of current study provides valuable information for the forthcoming studies in the Krishna River region fishery management. In the present study murrel *Channa striata* was selected for the observation of diet composition and feeding habits in the selected area of river Krishna, Andhra Pradesh.

2. MATERIALS AND METHODS

Fish sampling are collected from 3 stations of the River Krishna, Guntur district of Andhra Pradesh and they are Station-ST1: Amaravati - Its located 16°34'50.36"N Latitude and 80°2I'10.65"E Longitude**.** Station-ST2: Venkatapalem - Its located 16°31'01.67"N Latitude and 80°33'31.71 "E Longitude**.** Station-ST3: Seethanagaram, near Prakasam barrage - Its located 16°30'00.76"N Latitude and 80°36'01.99"E Longitude with the help of fisherman during June, 2019 to May, 2020. The collected fishes were brought to the laboratory and total length, and weight were measured of fishes and also the dissected and also preserved 5% formalin. The content each stomach was examined using binocular microscope. The weight of the stomach of the individual fish was recorded, based on the weight of the stomach and body weight of the fish C.sriata. Gastro somatic index of each and every fish was calculated using the following formula.

Gastro Somatic Index (GSI) = (Weight of the stomach)/(Weight of the fish) X 100

Twenty fishes are sacrificed in each month for quantitative analysis by using both occurrence and point's volumetric method [14]. The matters of food were smallest size and their volume could be estimated only by allotment of points. The volume index was evaluated from the total points of the entire item recorded over the period of study. In order to get a clear picture of frequency of occurrence as well as volume of various food items in the stomach was recorded [15].

Feeding intensity during various months was observed from the data on the grade of fullness of the stomach. The condition of feed was determined by the observations of the degree of distension of the stomach as described by [16]. Fishes with stomach wth gorged, full, ¾ full, ½ full were considered to be feeding actively, while, stomach with ¼ full and empty were considered to poor feeding activity The percentage occurrence of stomach under different circumstances of feeding was also calculated for the whole period of study.

2.1 Point's Method

The degree of apparent, the fullness of the fish stomach the points were allocated. Gorged (1.25); Full (1.00), ¾ Full (0.75), ½ full (0.50), ¼ full (0.25) and empty was (0.00).

3. RESULTS AND DISCUSSION

During study period a total 240 (120 males and 120 females) guts of *C. striata* were examined. The food composition of male fishes were represented in Figs. (1-4) and the female fishes were represented in Figs. (5-8). The feeding intensity of *C. striata* males were presented in Table 1 and the females were presented in Table 2. The stomach content composed the fishes and their larvae, crustaceans, insect larvae, annelids with semi digested items and unidentified materials. Fishes are identified as of teleost particularly major carps and minor carp's larvae, but most of the fish remains could not be identified since they are found in advanced stages of digestion with only scales and bones are remains. Gastropods identified as polycheate larvae, and crustaceans goes to prawn, shrimp and crab larvae.

Murrels are air breathing fishes and they have unique capacity to utilize atmospheric oxygen for respiration by certain morphological adaptations. They are capable for surviving even minute quantity of water [4]. This fish an important fresh water fishery in various states of India and in great market demand because of their pleasant tasty flesh and presence of less number of bones/ spines and also they have medicinal value. Although they popular in fishery, but proved a curse in other species for having an aggressive carnivorous nature. Murrels are commended all over the country for their flavor, medicinal and recuperative attributes high quality mineral and low fat contents. They are also considered as pest fish since they destroy other species in water body [4].

The investigation revealed that *C. striata was* omnivore species feeding mainly on fishes followed by crustaceans, insects and annelids and gastropods. Murrels pray on fishes, crustaceans, worms, molluscs and insect larvae [17,18]. Braga et al., [19] explained that the feeding intensity of a species linked its population dynamics. Shamsan and Ansari [20], reported that fishes and crustaceans are the most favorable food items of carnivore fishes. In the present study preferential food C. *striata* are fishes & crustaceans. Gastro somatic index recorded highest in the months of September (5.53) and October (6.4) in case of males and females goes to September (5.69) and October (6.8).

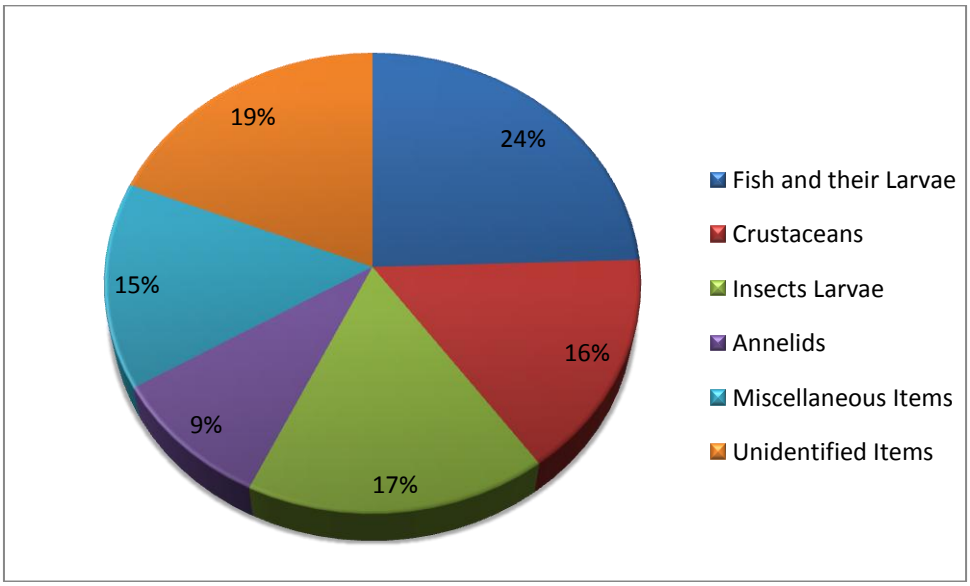

Fig. 1. Percentage of food composition of *male Channa striata* in the south west monsoon, 2019-2020

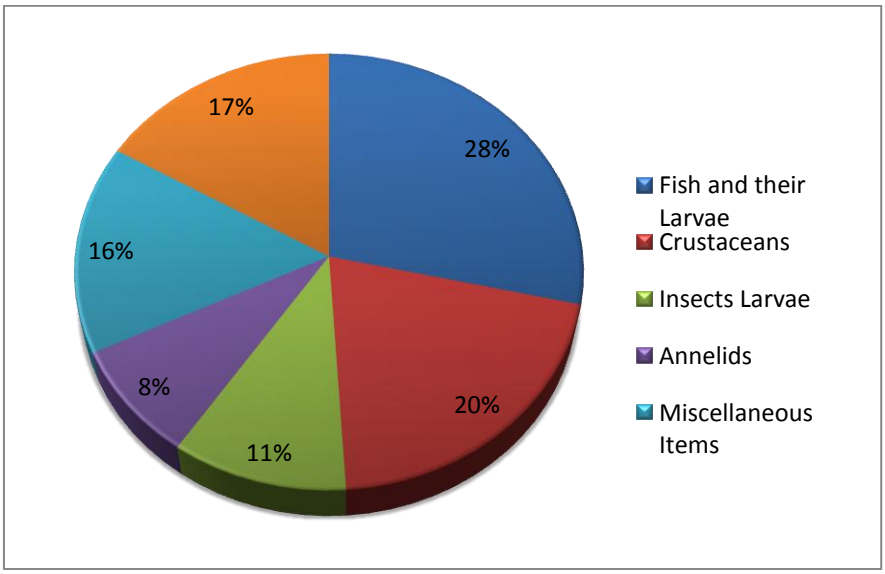

Fig. 2. Percentage of food composition of male *Channa striata* in the post monsoon, 2019-2020

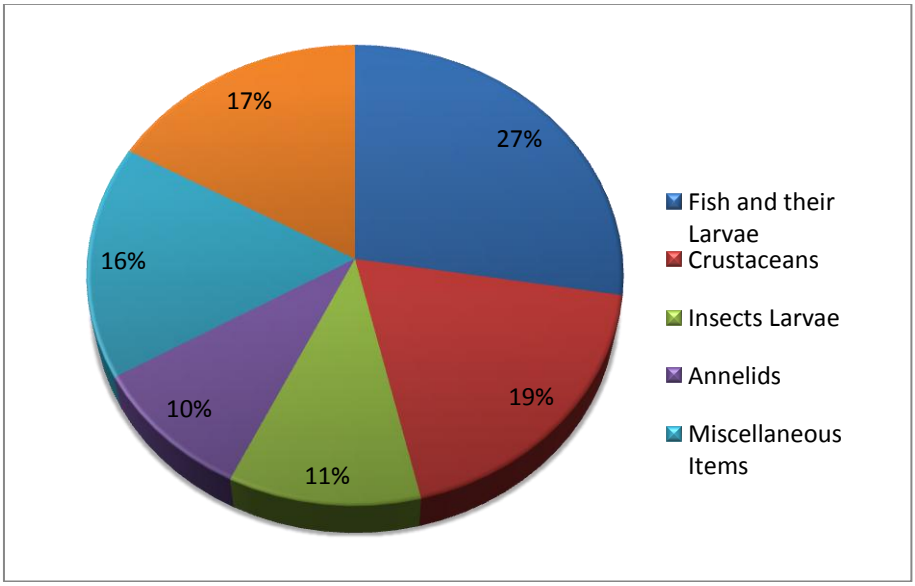

Fig 3. Percentage of food composition of male *Channa striata* in the north east monsoon, 2019-2020

Abundance and diversity of food organisms was play an important role in survival, growth and maturity in fishes and they can be achieved through selection of quality food or better nutrition. The seasonal effect on the structure of the food web and consequence on fish food [21]. Gastro somatic index values as an indication of fullness of stomach and find out the feeding rhythm. During the course of the investigation, maximum numbers of fishes were found with empty stomach. The frequent occurrence of empty stomach or stomach with little content might be dependent on the ratio between the size of the fish and size of the prey as cited on the caloric values of the diet as explained by [22]. The occurrence of empty stomachs of fishes does not show any relationship either to seasonal month or to the size of the fish. Feeding intensity of the fish and feeding behavior and also food intake by fish can encounters their energy requirements time to time [23]. Food has low energy, fish will compensate by fed more food and stomach capacity [24].

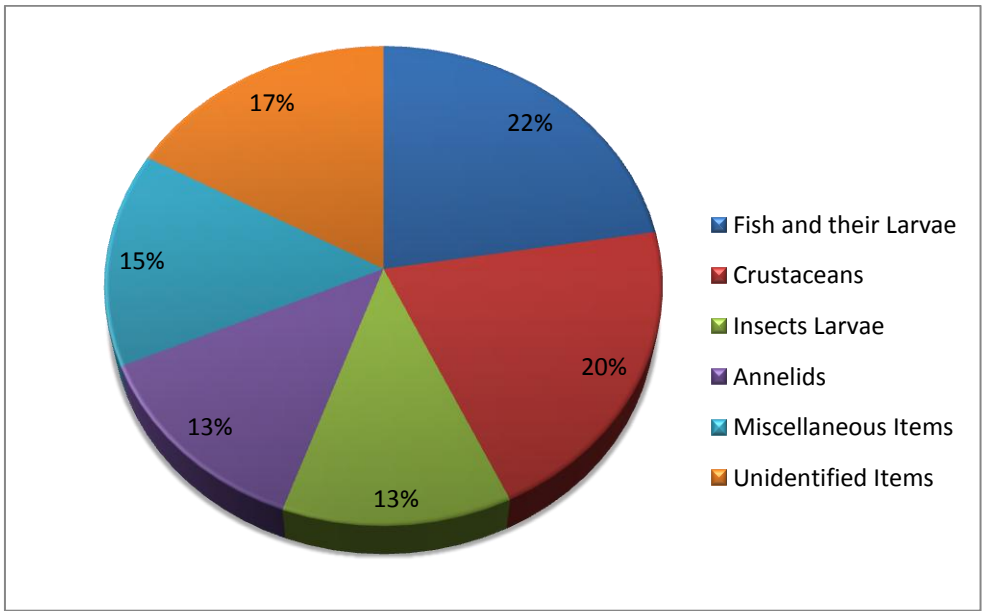

Fig. 4. Percentage of food composition of male *Channa striata* in the summer, 2019-2020

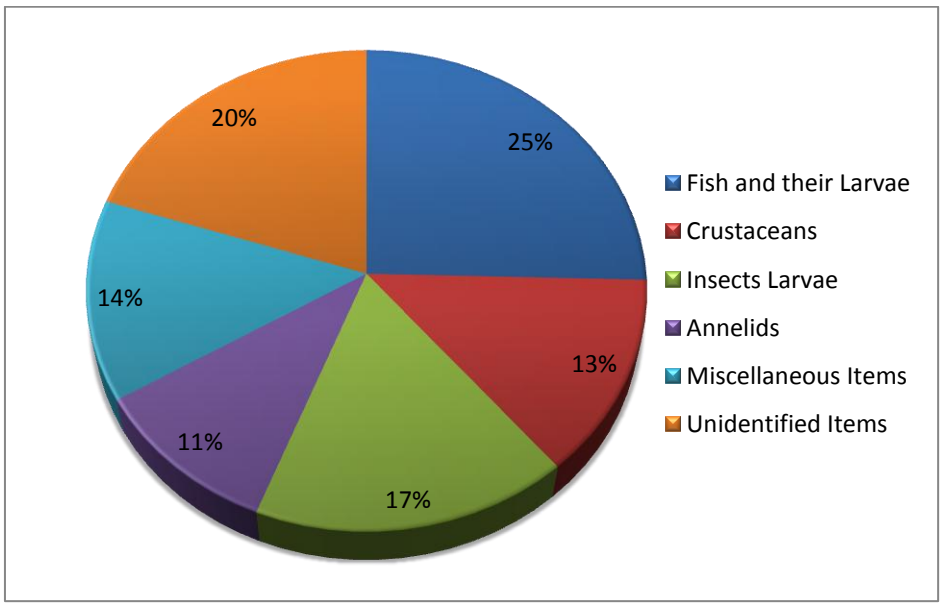

Fig. 5. Percentage of food composition of female *Channa striata* in the south west monsoon, 2019-2020

The ranking of various food composition with ranked first by fishes dominated during the entire study period followed by crustaceans, insect larva, annelids, worms and Gastropods. This observations similar thewith diet composition of carnivorous fishes from coral reef lagoons [25]. Kulbicki et al., [26] reported that the fishes are opportunistic feeders and changes in number of prey types reflect on the particular ecosystem where the fish is feeding. The length of the alimentary canal is indicate the food preferences of the fishes [27,28]. Wilson [29] stated that an increase in protein levels of food during summer period. Madhupratap et al., [30], reported that adverse environmental conditions resulting in less than optimum plankton food production. The present study was confined that the food items available in the guts which revealed that there are seasonal variations in diet and may influencing feeding patterns in all seasons. Manojkumar.et al., [31] says that *Nemipterus japonicus* is a demorsal carnivorous fish and the

food items consisted of fish larvae, crustaceans, molluscs, polychaetes and miscellaneous food items. In our results also shows that the *C. striata* is an carnivorous and diet containing fish and their larvae, crustaceans, insects and annelids are the major food items. Jambo and Maduako, [32], reported that the food and feeding habit of *Mugil cephalus* from Niger delta and it was fish larvae, crustaceans, insect parts annelids and other plant material along with sand particles. Krishna et al., [33], reported that the *Lates calcarifer* is an top predator and gut contains crustaceans, fishes, and polychaete worms some extent.

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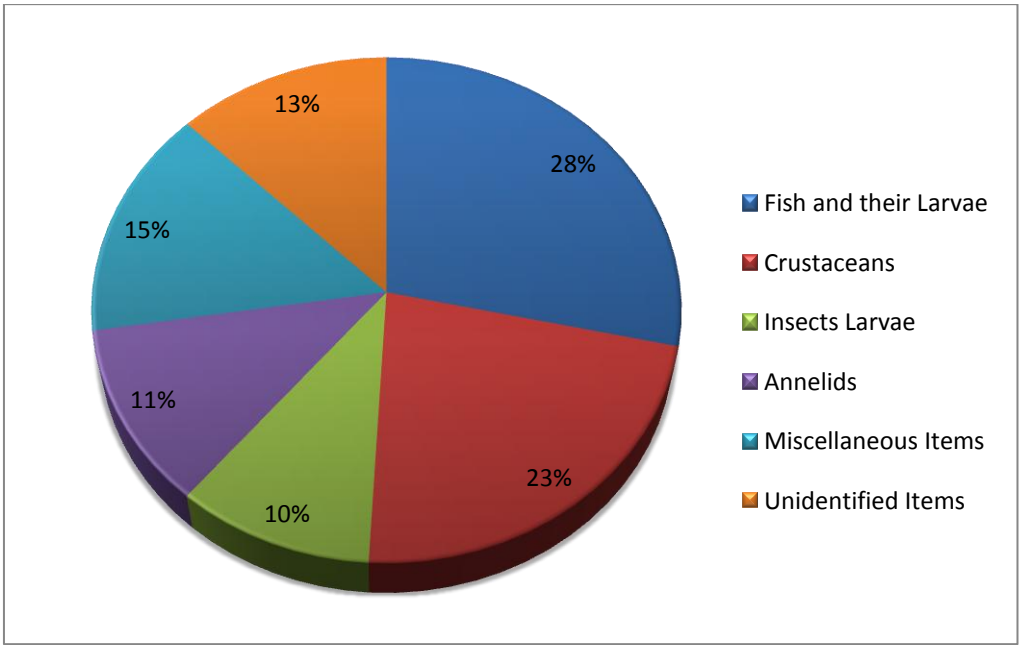

Fig. 6. Percentage of food composition of female Channa striata in the Post Monsoon, 2019-2020

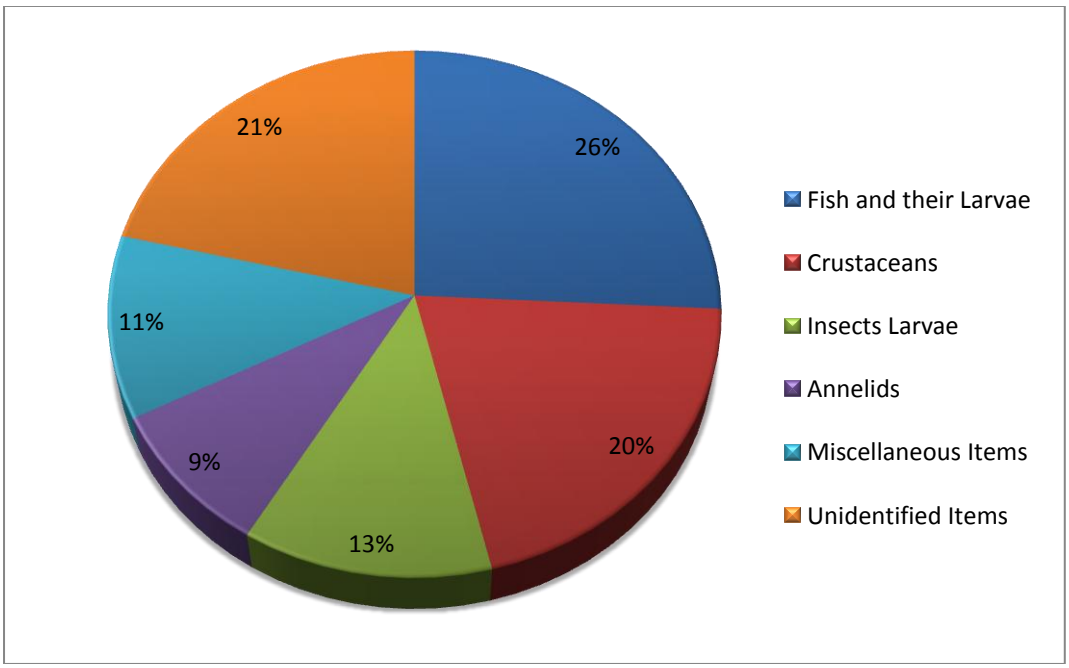

Fig. 7. Percentage of food composition of female Channa striata in the North East Monsoon, 2019-2020

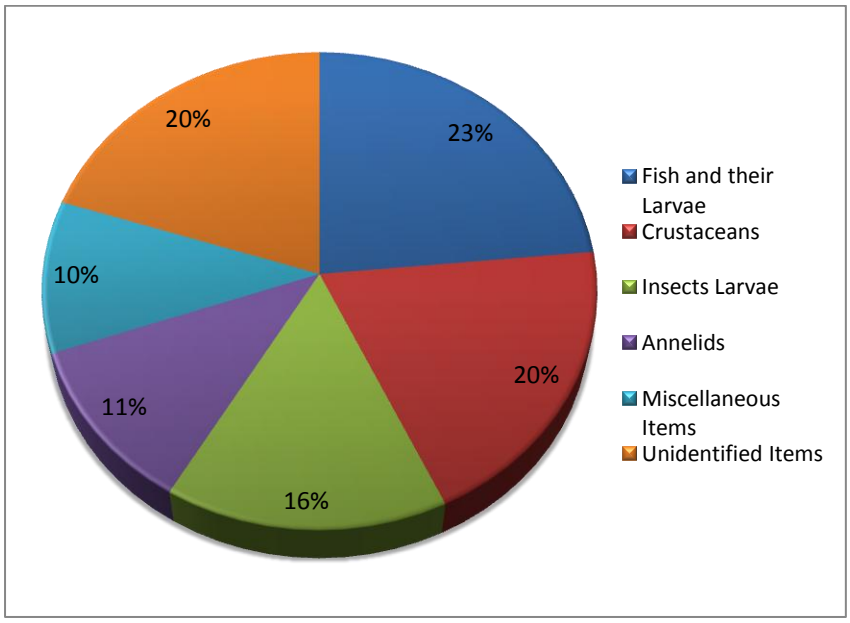

Fig. 8. Percentage of food composition of female Channa striata in the summer, 2019-2020

Table 1. Seasonal variations and feeding intensity in *C.striata* males

Seasons	Months	Status					
		Gorged	Full	¾ Full	½ Full	¼ Full	Empty
South west monsoon	June	0	0	5	10.5	25.5	59
	July	0	0	6	12.5	29.5	52
	August	0	5	9	14.2	30.5	41.3
	September	3	6	12	16.5	26.8	35.7
Post monsoon	October	4	8	13	15	22.5	37.5
	November	6	10	15.4	18	12.5	38.1
North east monsoon	December	5	12	16.5	10	15.5	41
	January	7	13	8	16	18.8	37.2
	February	9	14	10.5	19.5	14.9	32.1
Summer	March	8	12	6.5	15.5	19.3	38.7
	April	4	15	19	14.8	10.6	36.6
	May	0	12	16	15.5	16.8	39.7

Table 2. Seasonal variations and feeding intensity in *C. striata* females

Seasons	Months	Status					
		Gorged	Full	¾ Full	½ Full	¼ Full	Empty
South west monsoon	June	0	0	6	11.5	20.5	62
	July	0	0	8	15.4	20.8	55.8
	August	0	7	12	15.6	22.5	42.9
	September	5	12.5	16.8	22.3	13.4	30
Post monsoon	October	8	14.4	18.5	10.5	15.8	32.8
	November	5	13	18.4	18.5	15.4	30.7
North east monsoon	December	4	14.5	10.4	10.6	19.6	40.9
	January	5	11.5	16.4	18.5	11.4	37.2
	February	6	13.5	14.2	15.5	15.6	35.2
Summer	March	6	9.5	17.2	14.3	22.2	30.8
	April	3	12.5	13.5	13.4	19.5	38.1
	May	0	6	12	11.5	24.5	46

4. CONCLUSION

Based on the research result, it was concluded that the diet composition and feeding intensity of *Channa striata* from Krishna River were Fishes and their larvae (22- 28%), followed by crustaceans (19- 23%), insect larvae, annelids with semi digested items and unidentified materials. The percentage occurrence of feeding intensity indicated their preference for fish's food. There were empty stomach 62% in the month of May was observed in and the remaining was filled with food in different levels.

ACKNOWLEDGEMENT

The authors are thankful to DST- FIST, Government of India for providing for financial assistance.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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