International Journal of Fauna and Biological Studies
Available online at www.faunajournal.com

ISSN 2347-2677
www.faunajournal.com
IJFBS 2020; 7(4): 187-190
Received: 15-05-2020
Accepted: 22-06-2020

Shanmukha Rao Mallipudi
Department of Zoology and Aquaculture, Acharya Nagarjuna University, Nagarjuna Nagar, Andhra Pradesh, India

Raja Sekhar Mallipudi
Department of Zoology, Andhra University, Visakhapatnam, Andhra Pradesh, India

G Simhachalam
Associate Professor, Department of Zoology and Aquaculture, Acharya Nagarjuna University, Nagarjuna Nagar, Andhra Pradesh, India

Corresponding Author:
Shanmukha Rao Mallipudi
Department of Zoology and Aquaculture, Acharya Nagarjuna University, Nagarjuna Nagar, Andhra Pradesh, India

Seasonal variations in the proximate composition of *Puntius thomassi* (Day, 1874) from Tungabhadra River, Karnataka, India

Shanmukha Rao Mallipudi, Raja Sekhar Mallipudi and G Simhachalam

Abstract
Proximate analysis of the small indigenous cyprinid fish, *Puntius thomassi* was conducted for a period of one year (March, 2018 to February, 2019). Seasonal variation in the biochemical composition of the fish muscle was carried out for both non-infected and infected fishes. The highest protein content for non-infected fish was observed as16.18% and 16.77% during post-monsoon season and for infected fishes it was observed as 16.10% and 16.19% during pre-monsoon season. The highest lipid content for non-infected fish was observed as 3.12% and 2.82% during pre-monsoon season and lowest was 2.10% and 1.86% during monsoon season. Significant variation in the moisture and ash content of non-infected and infected fish was also observed. The present study revealed a strong correlation between the proximate composition and spawning periodicity of the fish. The present study also indicates *Puntius thomassi* as a potential source of nutrients for human consumption.

Keywords: *Puntius thomassi*, proximate composition, seasonal variations, Tungabhadra river

Introduction
Fish as a valuable source of important nutrients is well accepted. The demand for fish in providing food security is increasing globally. This is possible only by a sound knowledge of nutrient composition of several fish species and their proper exploitation. It should be noted that not all the fish species are having the nutrients with similar quality and quantity. This forms the basis for studying the nutrient profiles of different fish species to understand the implications and better choices for selecting the fish species. The amino acid composition and easy digestibility of fish protein makes them as a good source of diet protein [1]. Apart from common carps preferred by many people for their taste, small fishes are also now a days gaining attention by people in the rural areas due to their easy availability and low cost. Small fishes with thin body possess a very high amount of moisture content and results in whitish appearance of its flesh [2]. On an average, fish contains 16-21% of protein, 1.2-1.5% carbohydrate, 0.2-2.5% of fat and 66-81% of moisture [3].
Puntius thomassi is a commonly available small indigenous fish of the family cyprinidae in the Tungabhadra river basin. These fishes form a good catch by the local fishermen along with other common edible fishes. The helminth parasites have a profound effect on these fishes by interfering their metabolic activities. The effect of these parasites on the normal growth and nutrient composition of the fishes is well established only for a few fishes of food importance. Hence an attempt was made to understand the effect of helminth parasites in changing the proximate composition of muscle tissue of *Puntius thomassi*.

Materials and methods
The fishes for the present study i.e., *Puntius thomassi* were collected from the river Tungabhadra at two locations i.e., Nilogipur (Koppal district) and Dhadesugur (Raichr district) of Karnataka, a southern state of India. The study was conducted for one year (March, 2018 to February, 2019) by considering three seasons. The fishes were collected with the help of local fishermen and brought to the laboratory for the analysis of proximate composition. Thoroughly cleaned fish samples were stored in a freezer until the analysis was made. Standard methods [4] were employed for the proximate analysis.

Protein

The protein estimation of the fish muscle sample was conducted by Micro-Kzeldahl method. About 0.5 g of samples was digested in digestion unit for about 60 minutes. The digest was transferred to a distillation chamber for distillation. Then it was titrated with 0.1N HCL and protein was obtained by multiplying the total nitrogen by a conversion factor of 6.25.

N (%) = [(Titration Reading - Blank Reading) × Strength of acid ×14×100]/Weight of the Sample ×1000

Protein (%) = N (%) ×6.25

Lipid

Ether extract was measured by using Soxtec extraction unit by using petroleum ether at a boiling point of 40-60ºC as a solvent.

Lipid (%) = (Weight of the Residue/Sample Weight) ×100

Moisture

The estimation of moisture content of the sample was done by drying the fish muscle samples at 105ºC to a constant weight for about 24 hrs.

Moisture (%) = (Weight Loses/Weight of Sample taken) × 100

Ash

The amount of ash in the sample was estimated by weighing samples in a porcelain crucible and placed in a muffle furnace at 600ºC for about 6 hrs.

Ash (%) = (Weight of the Ash/Sample Weight) ×100

Results

Seasonal variation in the proximate composition of non-infected and infected *Puntius thomassi* were presented in the tables and the same was represented in the respective graphs. The physiological standards of a fish can be evaluated by its protein content [5]. Protein content of non-infected fish at Nilogipur was reported as 15.85% and at Dhadesugur as 15.95%. In the infected fish, the protein value at Nilogipur was observed as 15.20% and at Dhadesugur it was reported as 15.14% which indicates that the fish infected with helminth parasites shows moderately low protein content than the non-infected fish. Season wise analysis of protein content shows that during monsoon season (spawning period), low values and during pre-monsoon (pre-spawning) season high values were reported in infected as well as non-infected fish. The decreased protein content during the spawning period is due to utilisation of proteins for the development and maturation of gonads. This result was in line with the studies of Ganeshwade *et al.* [6] in the freshwater fish *Mystus cavasius*, Roopma Gandotra *et al.* [7] in *Labeo boga* and Mahdi *et al.* [8] in *Shizothorax esocinus.*

The lipid content in the muscle tissue of non-infected fish was 2.73% and 2.41% at Nilogipur and Dhadesugur respectively whereas it was observed as 2.27% and 2.44% at Nilogipur and Dhadesugur in infected fish which indicates a light decrease in the lipid content of infected fish. Like protein, the lipid content also reported least values during monsoon (spawning) season as the lipids are utilised for ovulation and spawning. These results were agreeing with the studies of Parulekar and Bal [9], Bumb [10].

The moisture content was reported 73.29% and 74.02% at Nilogipur and Dhadesugur in non-infected fish whereas the moisture content of infected fish at Nilogipur was estimated as 76.35% and as 76.14% in Dhadesugur. A significant increase in the levels of moisture content was observed in infected fish compared to non-infected fish. The highest moisture content was observed in monsoon season and the lowest values were observed in post-monsoon season in both infected and non-infected fish. The results obtained in the present study indicate an inverse relationship of moisture content with protein and lipids. Similar findings were made by Lone and Matty [11] and Roopma *et al.* [7], Winfre and Stickney [12].

In the present study, the ash content of non-infected fish at Nilogipur was reported as 3.37% and at Dhadesugur as 3.82% whereas these values in infected fish was observed as 4.52% and 4.64% at Nilogipur and Dhadesugur respectively. Overall, the ash content of infected fish reported much higher than the non-infected fish. During pre-monsoon season, the ash content was observed slightly higher than the remaining seasons. This is due to the high mineral requirements during the growth phase of the fish [13] and also indicates the high mineral metabolism by the fish during this season [14]. Similar observations were made by Basade *et al.* [15].

The spawning period in *P. thomassi* extends from May to October with peak time during June to August (Monsoon). The nutrient profile of a fish is directly affected by its reproductive activity. A significant change in the proximate composition of *P. thomassi* was observed in relation to its spawning periodicity. Seasonal variation in the biochemical composition of fishes is also due to some changes in the environmental conditions [6].

Table 1: Seasonal variations in Protein (%) during 2018-19 in *Puntius thomassi* in the two study areas

Seasons	Non-infected fish		Infected fish	
	Nilogipur	Dhadesugur	Nilogipur	Dhadesugur
Pre-Monsoon	16.18	16.77	16.10	16.19
Monsoon	14.80	14.51	14.37	14.27
Post-Monsoon	16.59	16.59	15.13	14.96
Mean	15.85	15.95	15.20	15.14
STDV	0.9377	1.2560	0.8671	0.9725

Table 2: Seasonal variations in Lipid (%) during 2018-19 in *Puntius thomassi* in the two study areas

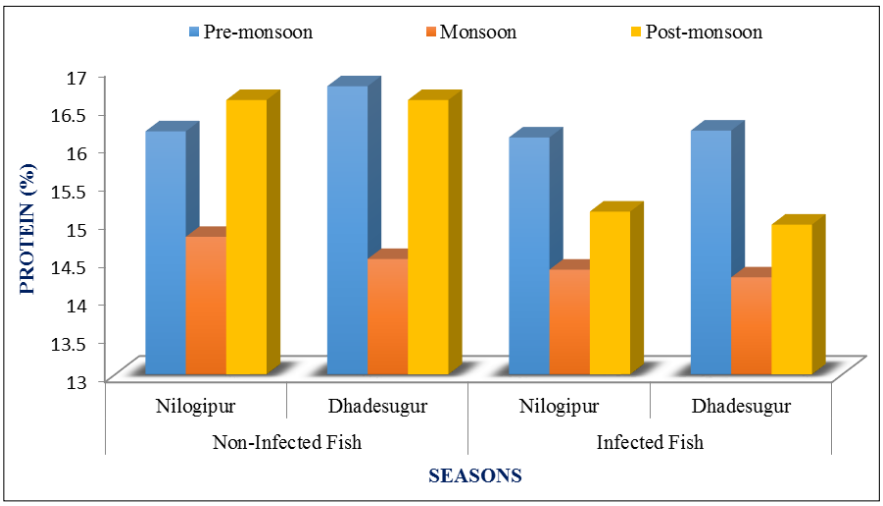
Seasons	Non-infected fish		Infected fish	
	Nilogipur	Dhadesugur	Nilogipur	Dhadesugur
Pre-Monsoon	3.21	2.82	2.43	2.95
Monsoon	2.10	1.86	1.79	1.75
Post-Monsoon	2.88	2.55	2.60	2.64
Mean	2.73	2.41	2.27	2.44
STDV	0.5700	0.4950	0.4271	0.6229

Table 3: Seasonal variations in Moisture (%) during 2018-19 in *Puntius thomassi* in the two study areas

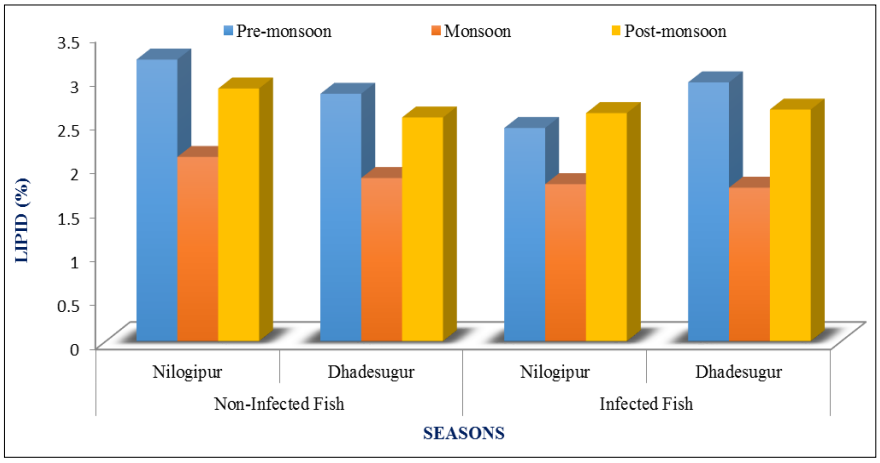
Seasons	Non-infected fish		Infected fish	
	Nilogipur	Dhadesugur	Nilogipur	Dhadesugur
Pre-Monsoon	73.34	73.98	76.51	76.03
Monsoon	74.13	75.23	77.87	77.74
Post-Monsoon	72.41	72.86	74.67	74.65
Mean	73.29	74.02	76.35	76.14
STDV	0.8609	1.1855	1.6059	1.5479

Table 4: Seasonal variations in Ash (%) during 2018-19 in *Puntius thomassi* in the two study areas

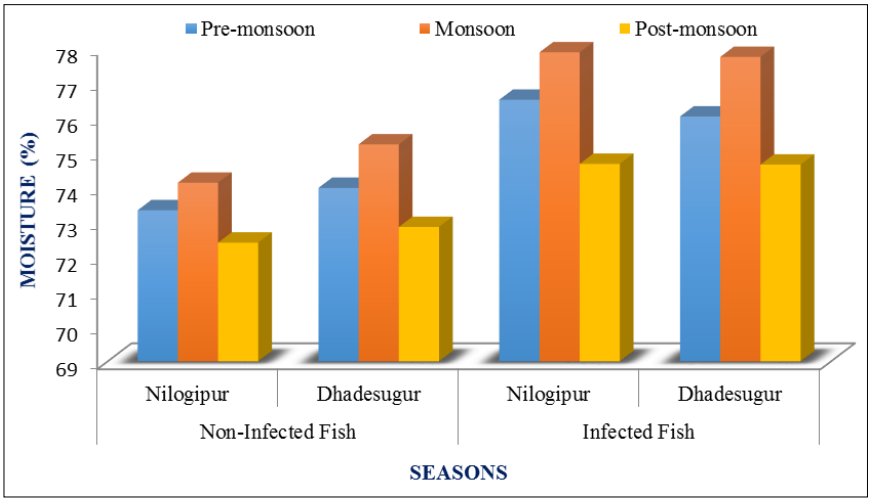
Seasons	Non-infected fish		Infected fish	
	Nilogipur	Dhadesugur	Nilogipur	Dhadesugur
Pre-Monsoon	3.49	3.99	4.96	5.10
Monsoon	3.16	3.79	4.53	4.56
Post-Monsoon	3.46	3.70	4.07	4.28
Mean	3.37	3.82	4.52	4.64
STDV	0.1824	0.1484	0.4450	0.4168



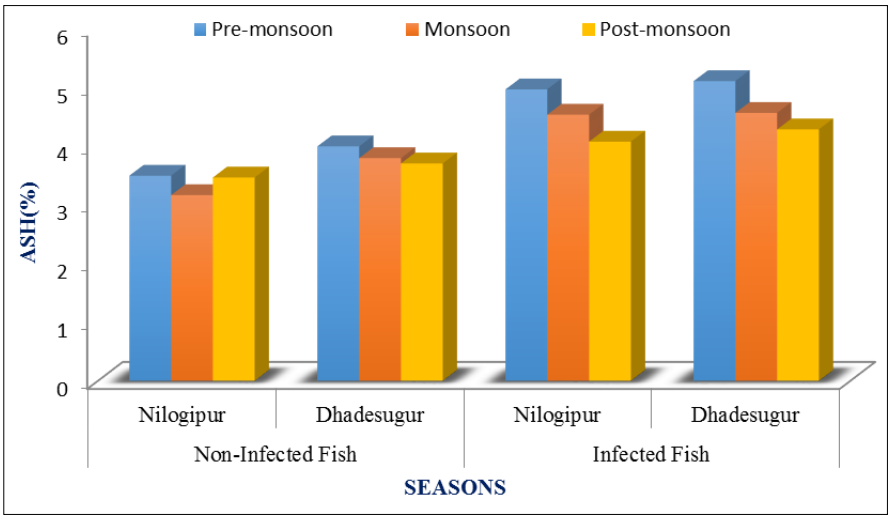
Graph 1: Seasonal variation in Protein (%) during 2018-19 in *Puntius thomassi* in the two study areas



Graph 2: Seasonal variations in Lipid (%) during 2018-19 in *Puntius thomassi* in the two study areas



Graph 3: Seasonal variation in Moisture (%) during 2018-19 in *Puntius thomassi* in the two study areas



Graph 4: Seasonal variation in Ash (%) during 2018-19 in *Puntius thomassi* in the two study areas

Conclusion

The acceptability of a fish species for consumption is determined by its nutritional status, easy availability among the other parameters. Parasites are known to adversely affect the nutrient quality of the fish and decreasing the preferential status by the consumer. The details of the present study were represented in the above tables and graphs. The results clearly indicate some affect on the nutritional quality of the fish. The overall nutritional status of the fish in the present study suggests that *Puntius thomassi* as an ideal fish for consumption.

References

1. Louka NF, Juhel, Loonis P. A novel colorimetric analysis used to compare different fish drying processes, Food Cont. 2004; 15:327-334.
2. Osman H, Suriah AR, Law EC. Fatty acid composition and cholesterol content of selected marine fish in malaysian waters, J Food Chem. 2001; 73:55-60.
3. Love RM. The chemical Biology of Fishes. Academic Press, Inc. London, UK, 1970, 547.
4. AOAC. Official Methods of Analysis. Edn 13, Association of official analytical chemists, Washington, DC, 2005.
5. Pilla S, Ratnakala M, Vijayalakshmi M, Sreeramakulu Biochemical compositions in the muscle and liver of Normal and infected fish of Lutjanus johni off Vishakhapatnam coast. International Journal of Engineering and Sciences. 2014; 4(9):38-42.
6. Ganeshwade RM, Ghanbahadur Ashwini G, Sonawane SR. Seasonal biochemical changes in the muscle of fresh water fish *Mystus Cavasius* (Ham.) Bioscience Discovery. 2016; 7(1):34-40.
7. Roopma Gandotra. Monika Sharma, Ritu Kumari. Studies on the Seasonal Variations in Proximate Composition of Labeo Boga, International Journal of Scientific Research and Modern Education. 2017; 2(2):5-9.
8. Mahdi AA, Faddagh MS, Tuman AJ, Abdullah TA. Biochemical composition and calorific value of six fresh water fish species from southern Iraqi Marshes Marsh. Bulletin. 2006; 1(1):47-53.
9. Parulekar AH, Bal DV. Observations on the seasonal changes in chemical composition of Bregmaceros mcclellandi J Univ. Bom. 1969; 38(65):88-92.
10. Bumb S. Studies on the biology of Commersoni's Glassy perchlet Ambassis commersoni (Cuvier). Ph.D Thesis Submitted To Goa University, 1992, 214.
11. Lone KP, Matty AJ. The effect of feeding methyl testosterone on the growth and body composition of common carp (*Cyprinus carpio*). Gen. Comp. Endocrinol. 1980; 40(4):409-424.
12. Winfre RA, Stickney RR. Effect of dietary proteins and energy on growth feed conversion efficiency and body composition of Tilapia aurea. J Nutr. 1981; 111(6):1001-1012.
13. Khwaja DK. Biochemical composition of the muscle of some freshwater fishes during prematurity phase. Fish Tech. 1966; 3:94-102.
14. Bano Y. Seasonal variation in the biochemical composition of *Clarias batrachus* L. Proc, Ind. Acad. Sci. 1977; 85B(3):147-155.
15. Basade Y, Kapila S, Kapila R. Changes in the muscle composition and energy contents of Golden Mahseer, Tor putitora (Hamilton) in relation to it' s spawning cycle. Indian journal of fisheries. 2000; 47(1):37-41.