ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of DEVELOPMENT RESEARCH

International Journal of Development Research
Vol. 5, Issue, 07, pp. 4940-4949, July, 2015

Full Length Research Article

BIOCHEMICAL COMPOSITION OF *PARASTROMATEUS NIGER* (BLOCH) FROM WITHIN AND OUTSIDE PFZ ZONES OFF RATNAGIRI DISTRICT COAST, MAHARASHTRA STATE, INDIA

***Dr. Tingote, R. S., Pawar, M. B. and Mane, U. H.**

Center for Coastal and Marine Biodiversity of Dr. Babasaheb Ambedkar Marathwada University Bhatye, Ratnagiri-415612

ARTICLE INFO

Article History:
Received 08th April, 2015
Received in revised form
21st May, 2015
Accepted 12th June, 2015
Published online 30th July, 2015

Key words:
Potential Fishing Zones,
Landing centers,
Protein,
Glycogen and Lipids

ABSTRACT

The PFZ advisory consist of Chlorophyll and Sea Surface Temperature is called Potential Fishing Zone on the contrary fishing is performed in the absence of PFZ advisory away from the PFZ is called as non-PFZ zone. With the help of PFZ advisory fishing activities are carried out in both within and outside PFZ realm by trawl & gill net upon hiring fishing boats from three fish landing centers off Ratnagiri coast. The pomfret fishes in the size range between 25-35cm were selected on board after completion of hauling. Especially these fishes are found in trawl catches and gill net too. An attempt has been made to estimate biochemical composition in comparison separate for male and female quantitatively during the study period 2008-2011 in the post spawning and early pre spawning seasons off pomfrets.

INTRODUCTION

The black pomfret, *Parastromateus niger* (Carangidae), locally called *Halwa*, is widely distributed in coastal waters of India and very limited information is also available from Indian waters (Sivaprakasam 1965; Rao 1973; Pati 1983; Kulkarni *et al*., 1991). In view of the continued importance of black pomfret to the commercial fishery in Ratnagiri coast, coupled with the scarcity of information on its biology both locally and regionally, the present study on biochemical composition was undertaken within PFZ and Non-potential fishing zone from three different fish landing centers. This is first attempt has been made with this kind of study after receiving PFZ data from the INCOIS. All the fishing boats were hired and as per PFZ data the fishing operations are carried in both within and outside PFZ zone with the help of trawl and gill net fishing gears throughout the study period. A free exchange of information and transfer of technology advances such as that developed through PFZ advisories and digital display boards by INCOIS-DOD is a prerequisite for achieving sustainable utilization of marine pomfrets fishery.

****Corresponding author: Dr. Tingote, R. S.***
Center for Coastal and Marine Biodiversity of Dr. Babasaheb Ambedkar Marathwada University Bhatye, Ratnagiri-415612

MATERIALS AND METHODS

All the black pomfrets were sorted out and collected on board from trawl and gill net fishing vessels utilized for PFZ validation experiment conducted in both within and outside PFZ, brought to laboratory to estimate biochemical composition for male and female fish respectively during 3 year sampling period in the post spawning and early pre spawning seasons from October-November 2008 to March-April 2011. A commencement of trawling in Ratnagiri district initiated in early 1960. Trawl net is the main important fishing gear for exploitation of demersal living resources. The trawl net varying from 30-50 OAL with wooden hull fitted with 40-160 HP engines and power winches. The trawl net is often operated from 15 to 25m long with 20m foot rope and 50-70kg otter boards and 10-20mm cod end mesh size. More than 50, the trawl gear boats were in fishery operation with varying capacity of 4-6 cylinders. Trawls are operated with varying at a depth of 10-40m. They were operated in accordance with the distance offered in the PFZ advisory mostly at an offshore. The standard duration of each haul by trawl net was 1.5 -3 hours by inquiry from fishers. The gill nets were usually operated at the inshore waters and the nets had a length of about 500 m and depth around 3-6 m and mesh size ranged from 80 to160 mm.

This gear is set subsequently after a gap of 4-6 hours, especially uplifted early in the morning. This net is operated especially at the surface mostly during night time at a depth of 10-15m; consist of 20-25 pieces. Each segment of net varies from 47 to 80m in length and 5m in breadth. Mesh size is 12 to 14mm. Fishes were collected from the fishing boats hired and brought in ice-box to the laboratory.

RESULTS

Protein content from *Parastromateus niger* from Mirkarwada

Muscle: The protein in the male muscle within PFZ value (18.941±0.818) was observed which is non-significant (P<0.05) whereas from outside PFZ study comparatively showed dwindled (16.984±0.607) in Nov-Dec. An increase in the male muscle protein from within PFZ value was (20.762±0.818) which is non-significant (P<0.05) on the other hand comparatively from outside PFZ study (18.806±0.535) in the month of March-April. The protein in the female muscle from within PFZ value was represented (18.468±0.509) which is non-significant (P<0.05) and comparative analysis of the study from outside PFZ showed (17.119±0.618) in Nov-Dec. The protein in female muscle from within PFZ value was somewhat increased to (18.738±0.710) which is non-significant (P>0.05) and as compared to outside PFZ study value (18.064±0.618) during March-April.

Gonad: The protein in the male testis from within PFZ was observed (13.948±0.607) which is non-significant (P>0.05) while analysis at outside PFZ showed (12.463±0.650) in Nov-Dec. The protein in male testis for within PFZ value was observed increased (17.321±0.710) which is less significant (P<0.01) on the other side at outside PFZ comparative study (14.960±0.607) in the month of March-April. The protein in the female ovary from within PFZ was noticed (14.960±0.535) which is non-significant (P<0.05) as compared to outside PFZ study (12.868±0.509) during Nov-Dec. The protein in the female ovary from within PFZ was observed (16.782±0.535) which is non-significant (P>0.05) and comparative study at outside PFZ showed value (14.960±0.404) in March-April.

Liver: The protein in the male liver from within PFZ value was expressed (11.586±0.509) which is non-significant (P<0.05) and simultaneous study at outside PFZ (10.169±0.421) in Nov-Dec. whereas from within PFZ the male liver protein was (13.610±0.650) which is non-significant (P>0.05) whereas comparative study from outside

Table 1. Protien content of *P. niger* during November-December

		Mirkarwada		Harnai		Sakhri-Natye	
Tissue	Sex	Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ
Muscle	Male	18.941	16.984	17.659	17.186	18.198	16.917
		0.818	0.607	0.650	0.535	0.350	0.710
		*		ns		ns	
	Female	18.468	17.119	19.480	19.278	20.155	19.278
		0.509	0.618	0.509	0.309	0.309	0.309
		*		ns		ns	
Gonad	Male	13.948	12.463	15.162	13.340	14.622	13.138
		0.607	0.650	0.202	0.404	0.509	0.809
		ns		*		ns	
	Female	14.960	12.868	20.965	18.266	17.119	15.432
		0.535	0.509	0.710	0.509	0.818	0.421
		*		**		*	
Liver	Male	11.586	10.169	14.285	12.936	12.733	11.114
		0.509	0.421	0.421	0.607	0.607	0.350
		*		ns		*	
	Female	10.372	9.089	16.647	14.960	15.702	13.813
		0.509	0.202	0.421	0.404	0.509	0.116
		*		**		***	

Mean value of 3 sample size with ± SD, *= P<0.05, **= P<0.01,***= P<0.001, ns= P> 0.05 non- significant

Table 2. Protien content of *P. niger* during March-April

		Mirkarwada		Harnai		Sakhri-Natye	
Tissue	Sex	Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ
Muscle	Male	20.762	18.806	18.536	17.119	20.425	19.413
		0.818	0.535	0.421	0.618	0.535	0.404
		*		ns		ns	
	Female	18.738	18.064	19.548	17.929	21.032	21.167
		0.710	0.618	0.618	0.618	0.404	0.710
		ns		ns		ns	
Gonad	Male	17.321	14.960	17.929	16.242	19.548	16.984
		0.710	0.607	0.618	0.116	0.710	0.809
		**		ns		**	
	Female	16.782	14.960	17.524	16.849	18.671	17.389
		0.535	0.404	0.710	1.018	0.710	0.809
		ns		ns		ns	
Liver	Male	13.610	12.328	14.690	12.936	16.647	15.230
		0.650	0.607	0.710	0.809	0.818	0.467
		ns		ns		ns	
	Female	14.218	12.463	16.647	14.757	16.512	14.757
		0.509	0.421	0.116	0.607	0.309	0.202
		**		***		**	

Mean value of 3 sample size with ± SD, *= P<0.05, **= P<0.01,***= P<0.001, ns= P> 0.05 non- significant

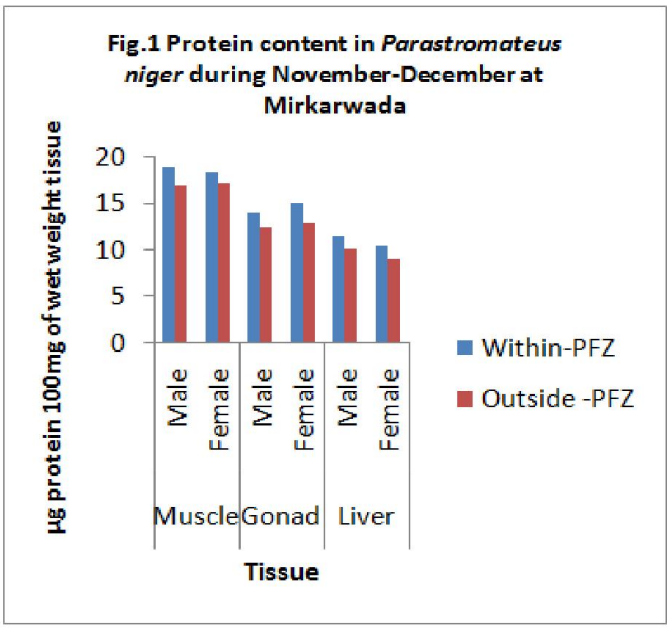


Fig.1 Protein content in Parastromateus niger during November-December at Mirkarwada
µg protein 100mg of wet weight tissue
20
15
10
5
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

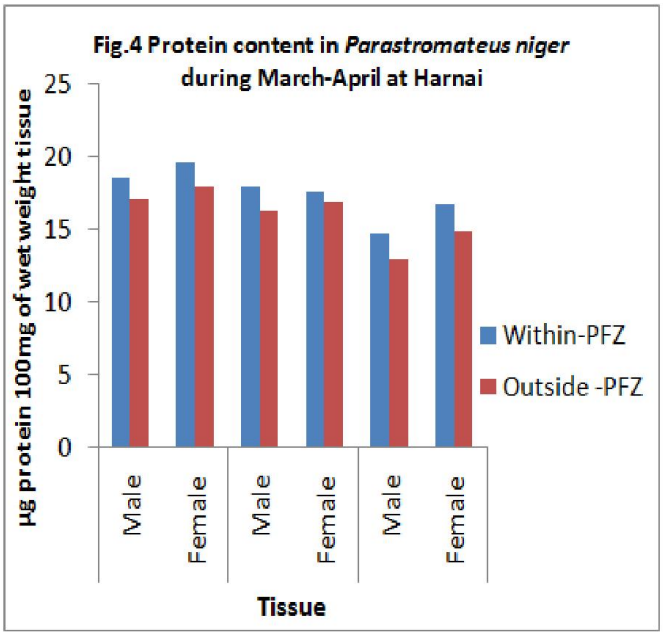


Fig.4 Protein content in Parastromateus niger during March-April at Harnai
µg protein 100mg of wet weight tissue
25
20
15
10
5
0
Male
Female
Male
Female
Male
Female
Tissue
Within-PFZ
Outside -PFZ

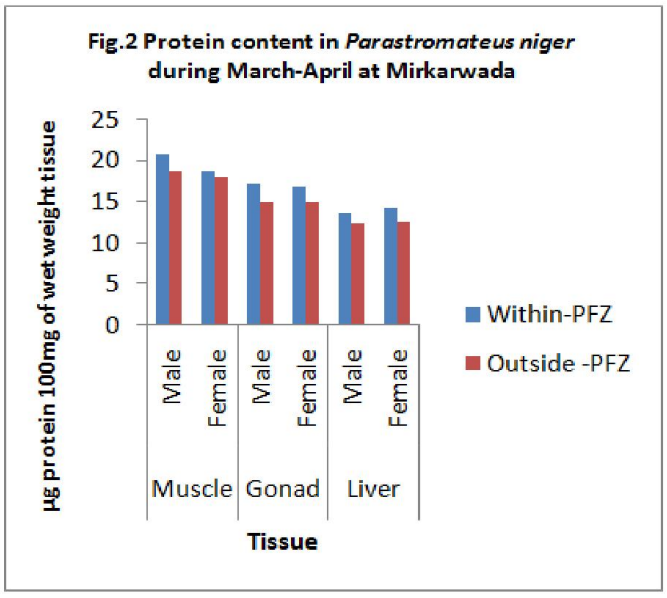


Fig.2 Protein content in Parastromateus niger during March-April at Mirkarwada
µg protein 100mg of wet weight tissue
25
20
15
10
5
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

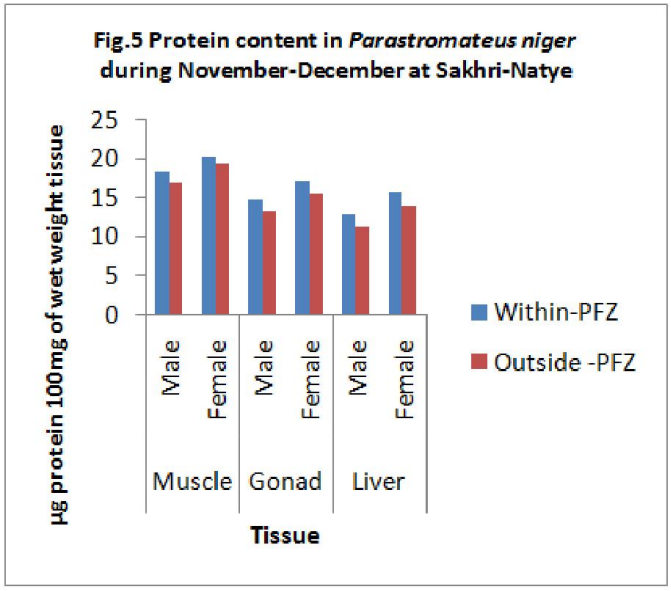


Fig.5 Protein content in Parastromateus niger during November-December at Sakhri-Natye
µg protein 100mg of wet weight tissue
25
20
15
10
5
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

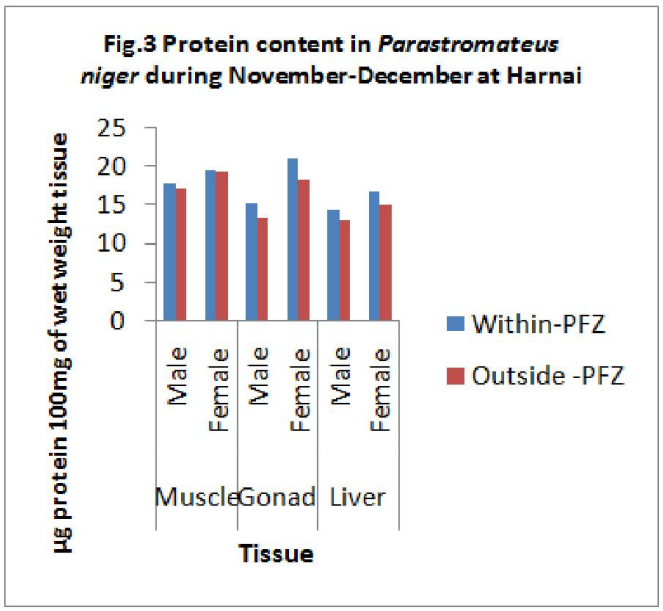


Fig.3 Protein content in Parastromateus niger during November-December at Harnai
µg protein 100mg of wet weight tissue
25
20
15
10
5
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

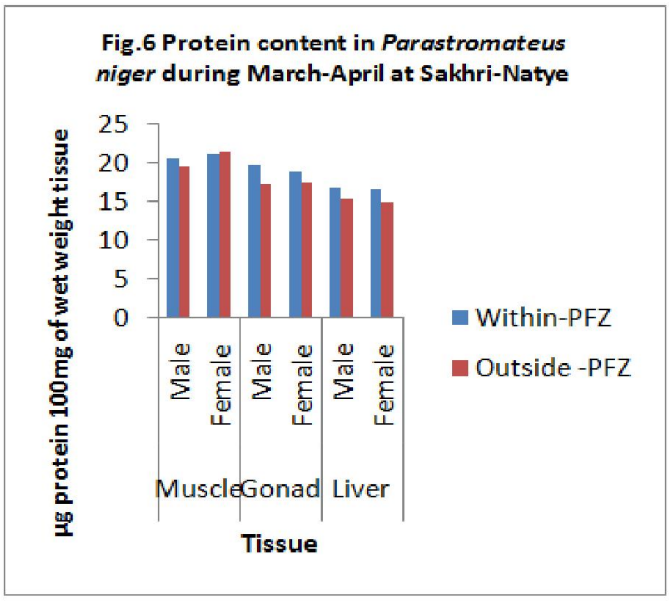


Fig.6 Protein content in Parastromateus niger during March-April at Sakhri-Natye
µg protein 100mg of wet weight tissue
25
20
15
10
5
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

PFZ (12.328±0.607) during March-April. The protein in the female liver from within PFZ showed (10.372±0.509) which is non-significant (P<0.05) while comparative study conducted from outside PFZ value showed (9.089±0.202) in Nov-Dec. The protein in the female liver increased from within PFZ was observed (14.218±0.509) which is less significant (P<0.01) and from data calculated from outside PFZ (12.463±0.421) in March-April.

Protein content from *Parastromateus niger* from Harnai

Muscle: The protein in the male muscle from within PFZ value (17.659±0.650) was observed which is non-significant (P>0.05) whereas from calculated study from outside PFZ showed (17.186±0.535) in Nov-Dec. respectively. Slightly increase in male muscle protein from within PFZ value was (18.536±0.421) which is non-significant (P>0.05) and on the other hand comparative study from outside PFZ (17.119±0.618) in the month of March-April. The protein in the female muscle from within PFZ value was represented (19.480±0.509) which is non-significant (P>0.05) and from the comparative study of an outside PFZ (19.278±0.309) in Nov-Dec. The protein in the female muscle from within PFZ value was (19.548±0.618) which is non-significant (P>0.05) and from outside comparative study (17.929±0.618) during March-April.

Gonad: The protein in the male testis from within PFZ was observed (15.162±0.202) which is non-significant (P<0.05) and calculated study from outside PFZ (13.340±0.404) in Nov-Dec. The protein in male testis for within PFZ value was observed increased (17.929±0.618) which is non-significant (P>0.05) when comparatively studied from outside PFZ (16.242±0.116) in the month of March-April. The protein in the female ovary from within PFZ was noticed (20.965±0.710) which is less significant (P<0.01) and study from outside PFZ showed (18.266±0.509) during Nov-Dec. The protein in the female ovary from within PFZ was observed as (17.524±0.710) which is non-significant (P>0.05) on the other hand from outside PFZ (16.849±1.018) respectively in March-April.

Liver: The protein in the male liver from within PFZ value was showed (14.285±0.421) which is non-significant (P>0.05) and when comparative study made from outside PFZ (12.936±0.607) in Nov-Dec. whereas from within PFZ the male liver protein was (14.690±0.710) which is non-significant (P>0.05) as compared with outside PFZ (12.936±0.809) during March-April. The protein in the female liver from within PFZ showed (16.647±0.421) which is less significant (P<0.01) while comparatively data analysis from outside PFZ (14.960±0.404) in Nov-Dec. The protein in the female liver from within PFZ was observed (16.647±0.116) which is highly significant (P<0.001) and from outside PFZ study (14.757±0.607) in March-April.

Protein content from *Parastromateus niger* from Sakhri-Natye

Muscle: The protein in the male muscle within PFZ value (18.198±0.350) was observed which is non-significant (P>0.05) whereas from outside PFZ showed dwindled (16.917±0.710) in Nov-Dec. respectively. An increase in the male muscle protein from within PFZ value was (20.425±0.535) which is non-significant (P>0.05) as compared to outside PFZ (19.413±0.404) in the month of March-April. The protein in the female muscle from within PFZ value was represented (20.155±0.309) which is non-significant (P>0.05) when comparatively from outside PFZ (19.278±0.309) in Nov-Dec. The protein in female muscle from within PFZ value was somewhat increased (21.032±0.404) which is non-significant (P>0.05) while comparatively study made from outside PFZ (21.167±0.710) during March-April.

Gonad: The protein in the male testis from within PFZ was observed (14.622±0.509) which is non-significant (P>0.05) when compared with outside PFZ (13.138±0.809) in Nov-Dec. The protein of male testis for within PFZ value was observed increased (19.548±0.710) which is less significant (P<0.01) while outside PFZ study (16.984±0.809) in the month of March-April. The protein in female ovary from within PFZ was noticed (17.119±0.818) which is non-significant (P<0.05) as compared to outside PFZ (15.432±0.421) during Nov-Dec. The protein in the female ovary from within PFZ was observed as (18.671±0.710) which is non-significant (P>0.05) when compared with outside PFZ (17.389±0.809) respectively in March-April.

Liver: The protein in the male liver from within PFZ value was showed (12.733±0.607) which is non-significant (P<0.05) while comparatively study made with outside PFZ (11.114±0.350) in Nov-Dec. whereas from within PFZ the male liver content protein was (16.647±0.818) which is non-significant (P>0.05) as compared to outside PFZ (15.230±0.467) during March-April. The protein in the female liver from within PFZ showed (15.702±0.509) which is highly significant (P<0.001) while in outside PFZ study (13.813±0.116) in Nov-Dec. The protein in the female liver from within PFZ was observed (16.512±0.309) which is less significant (P<0.01) and from outside PFZ showed (14.757±0.202) in March-April.

Glycogen content from *Parastromateus niger* from Mirkarwada

Muscle: The glycogen in the male muscle from within PFZ value (11.163±0.147) was observed which is less significant (P<0.01) whereas from outside PFZ showed somewhat dwindled (10.086±0.214) in Nov-Dec. respectively. An increase in the male muscle glycogen from within PFZ value was observed (14.254±0.259) which is highly significant (P<0.001) whereas comparatively from outside PFZ study (12.836±0.177) in the month of March-April. The glycogen content of the female muscle from within PFZ value was represented (12.581±0.298) which is highly significant (P<0.001) and outside PFZ value slightly decreased (11.447±0.177) in Nov-Dec. The glycogen in female muscle from within PFZ value was increased (14.310±0.170) which is highly significant (P<0.001) whereas compared with outside PFZ (13.034±0.225) during March-April.

Gonad: The glycogen in the male testis from within PFZ was observed (12.014±0.225) which is less significant (P<0.01) as compared to outside PFZ (10.965±0.259) in Nov-Dec.

Table 3. Glycogen content of *P. niger* during November-December

Tissue	Sex	Mirkarwada		Harnai		Sakhari-Natye	
		Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ
Muscle	Male	11.163 0.147 **	10.086 0.214	11.900 0.298 *	11.078 0.255	12.751 0.343 ***	11.277 0.129
	Female	12.581 0.298 ***	11.447 0.177	13.913 0.214 ***	12.751 0.177	13.460 0.170 ns	12.864 0.255
Gonad	Male	12.014 0.225 **	10.965 0.259	13.942 0.129 **	12.751 0.298	13.261 0.298 **	12.099 0.340
	Female	13.999 0.049 **	13.006 0.259	12.411 0.343 ns	12.212 0.214	13.913 0.259 ***	12.638 0.177
Liver	Male	13.431 0.129 ***	12.212 0.214	15.927 0.2551 ***	14.452 0.298	15.331 0.255 ***	14.112 0.177
	Female	15.558 0.098 ***	14.169 0.343	16.097 0.170 **	15.104 0.214	16.068 0.214 ***	14.396 0.225

Mean value of 3 sample size with ± SD, *= P<0.05, **= P<0.01,***= P<0.001, ns= P> 0.05 non- significant

Table 4. Glycogen content of *P. niger* during March-April

Tissue	Sex	Mirkarwada		Harnai		Sakhari-Natye	
		Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ
Muscle	Male	14.254 0.259 ***	12.836 0.177	15.444 0.214 *	14.792 0.049	14.934 0.214 ns	14.622 0.129
	Female	14.310 0.170 ***	13.034 0.225	15.700 0.049 **	14.764 0.298	15.416 0.147 ***	14.112 0.298
Gonad	Male	12.978 0.129 *	12.014 0.306	13.204 0.306 *	12.240 0.129	14.480 0.340 ***	12.949 0.340
	Female	15.303 0.177 *	14.424 0.196	14.027 0.177 ns	13.403 0.298	14.622 0.436 *	13.658 0.298
Liver	Male	14.424 0.177 **	13.29 0.340	16.153 0.129 **	15.104 0.259	15.785 0.214 ***	14.480 0.340
	Female	16.437 0.255 **	15.189 0.383	16.550 0.214 ns	16.153 0.298	15.558 0.343 *	14.509 0.298

Mean value of 3 sample size with ± SD, *= P<0.05, **= P<0.01,***= P<0.001, ns= P> 0.05 non- significant

The glycogen in case of male testis for within PFZ value was observed (12.978±0.129) which is non-significant (P<0.05) and outside PFZ (12.014±0.306) in the month of March-April. The glycogen of the female ovary from within PFZ was noticed (13.999±0.049) which is less significant (P<0.01) and compared to outside PFZ (13.006±0.259) during Nov-Dec. The glycogen in the female ovary from within PFZ was observed as (15.303±0.177) which is non-significant (P<0.05) and comparatively from outside PFZ (14.424±0.196) respectively in March-April.

Liver: The glycogen in the male liver from within PFZ value was showed (13.431±0.129) which is highly significant (P<0.001) while from outside PFZ study (12.212±0.214) in Nov-Dec. whereas from within PFZ the male liver content of glycogen was (14.424±0.177) which is less significant (P<0.01) and outside PFZ decreased (13.29±0.340) during March-April. The glycogen in the female liver from within PFZ showed (15.558±0.098) which is highly significant (P<0.001) while in outside PFZ (14.169±0.343) in Nov-Dec. The glycogen in the female liver increased from within PFZ was observed (16.437±0.255) which is less significant (P<0.01) and from outside PFZ comparatively analyzed (15.189±0.383) in March-April.

Glycogen content from *Parastromateus niger* from Harnai

Muscle: The glycogen in the male muscle within PFZ value (11.900±0.298) was observed which is non-significant (P<0.05) whereas from outside PFZ showed (11.078±0.255) in Nov-Dec. respectively. An increase in male muscle glycogen from within PFZ value was (15.444±0.214) which is non-significant (P<0.05) and slightly decreased at outside PFZ (14.792±0.049) in the month of March-April. The glycogen in the female muscle from within PFZ value was represented (13.913±0.214) which is highly significant (P<0.001) and comparatively outside PFZ (12.751±0.177) in Nov-Dec. The glycogen in female muscle from within PFZ value was somewhat increased to (15.700±0.049) which is less significant (P<0.01) as compared to outside PFZ (14.764±0.298) during March-April.

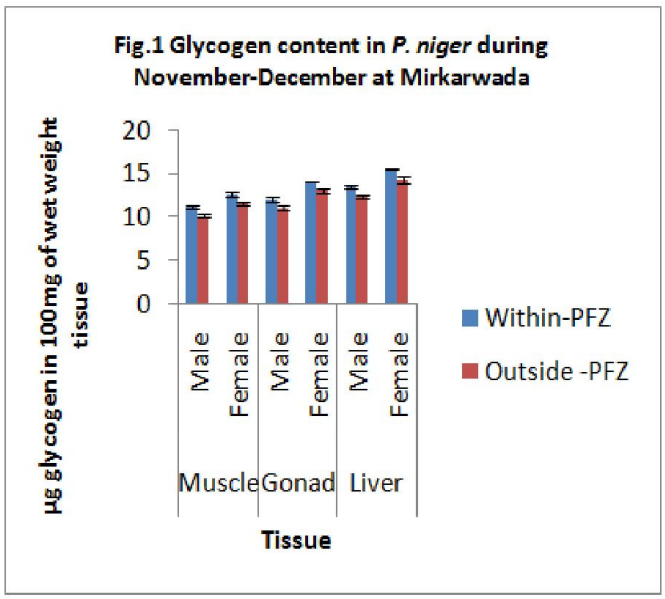


Fig.1 Glycogen content in P. niger during November-December at Mirkarwada
µg glycogen in 100mg of wet weight tissue
20
15
10
5
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

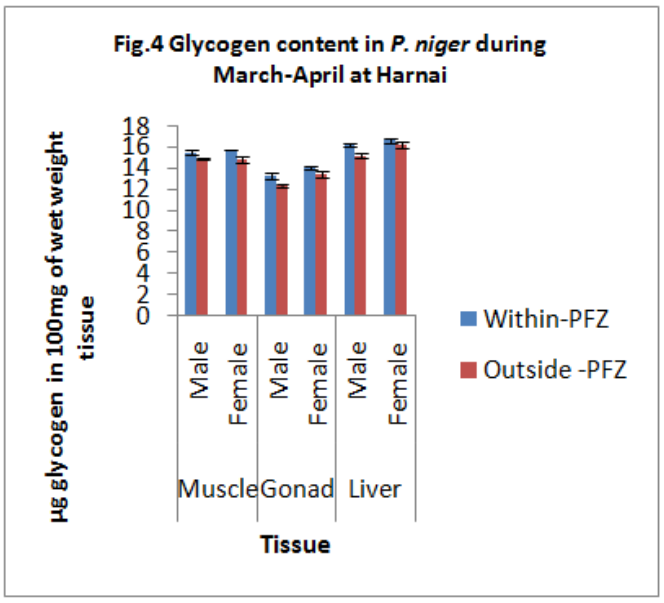


Fig.4 Glycogen content in P. niger during March-April at Harnai
µg glycogen in 100mg of wet weight tissue
18
16
14
12
10
8
6
4
2
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

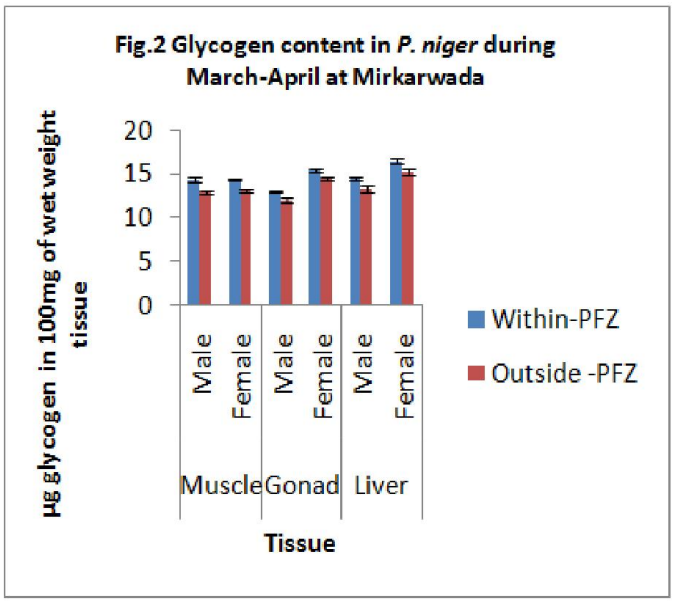


Fig.2 Glycogen content in P. niger during March-April at Mirkarwada
µg glycogen in 100mg of wet weight tissue
20
15
10
5
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

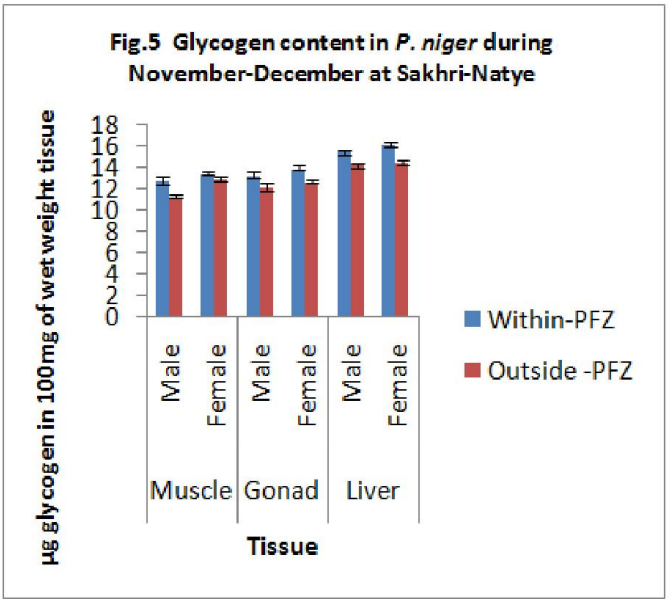


Fig.5 Glycogen content in P. niger during November-December at Sakhri-Natye
µg glycogen in 100mg of wet weight tissue
18
16
14
12
10
8
6
4
2
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

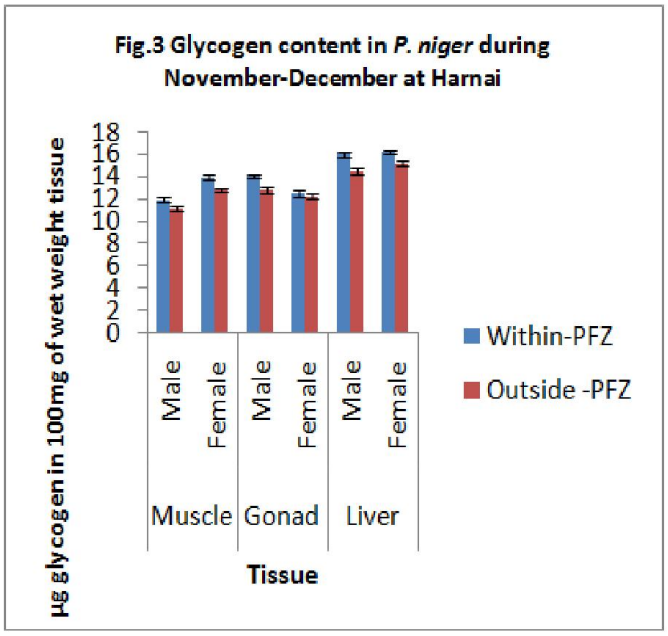


Fig.3 Glycogen content in P. niger during November-December at Harnai
µg glycogen in 100mg of wet weight tissue
18
16
14
12
10
8
6
4
2
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

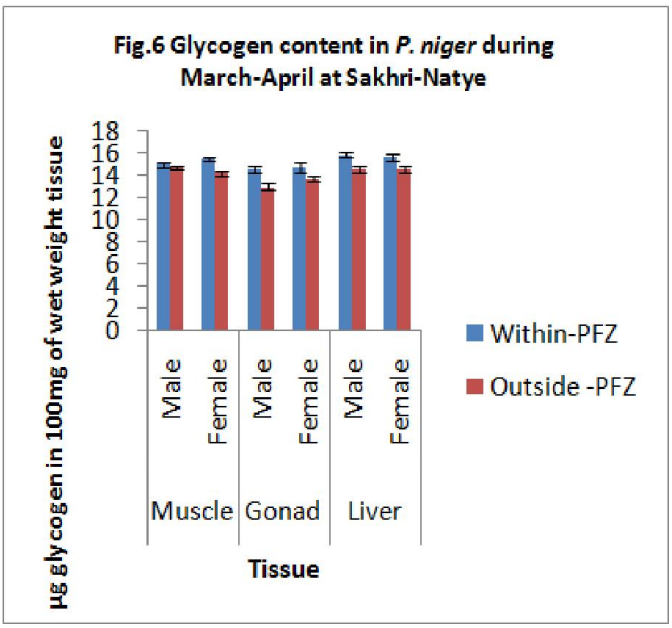


Fig.6 Glycogen content in P. niger during March-April at Sakhri-Natye
µg glycogen in 100mg of wet weight tissue
18
16
14
12
10
8
6
4
2
0
Male
Female
Male
Female
Male
Female
Muscle
Gonad
Liver
Tissue
Within-PFZ
Outside -PFZ

Gonad: The glycogen in the male testis from within PFZ was observed (13.942±0.129) which is less significant (P<0.01) as compared with outside PFZ (12.751±0.298) in Nov-Dec. The glycogen in the male testis for within PFZ value was observed (13.204±0.306) which is non-significant (P<0.05) and comparatively decreased from outside PFZ (12.240±0.129) in the month of March-April. The glycogen of the female ovary from within PFZ was noticed (12.411±0.343) which is non-significant (P>0.05) and slightly decreased from outside PFZ (12.212±0.214) during Nov-Dec. The glycogen in the female ovary from within PFZ was observed increased (14.027±0.177) which is non-significant (P>0.05) while study conducted for outside PFZ (13.403±0.298) respectively in March-April.

Liver: The glycogen in the male liver from within PFZ value was showed (15.927±0.255) which is highly significant (P<0.001) while as compared to outside PFZ (14.452±0.298) in Nov-Dec. whereas from within PFZ the male liver content of glycogen was increased (16.153±0.129) which is less significant (P<0.01) when studied difference from outside PFZ (15.104±0.259) during March-April. The glycogen in the female liver from within PFZ showed (16.097±0.170) which is less significant (P<0.01) while from outside PFZ (15.104±0.214) in Nov-Dec. The glycogen in the female liver from within PFZ was observed (16.550±0.214) which is non-significant (P>0.05) and from outside PFZ (16.153±0.298) in March-April.

Glycogen content from *Parastromateus niger* from Sakhri-Natye

Muscle: The glycogen in the male muscle within PFZ value (12.751±0.343) was observed which is highly significant (P<0.001) whereas from outside PFZ showed somewhat dwindled (11.277±0.129) in Nov-Dec. respectively. An increase in male muscle glycogen from within PFZ value was(14.934±0.214) which is non-significant (P>0.05) and comparatively from outside PFZ (14.622±0.129) in the month of March-April. The glycogen content of the female muscle from within PFZ value was represented (13.460±0.170) which is non-significant (P>0.05) and from outside PFZ (12.864±0.255) in Nov-Dec. The glycogen in female muscle from within PFZ value was increased to (15.416±0.147) which is highly significant (P<0.001) and experiment conducted from outside PFZ (14.112±0.298) during March-April.

Gonad: The glycogen in the male testis from within PFZ was observed (13.261±0.298) which is less significant (P<0.01) and from outside PFZ study (12.099±0.340) in Nov-Dec. The glycogen in the male testis for within PFZ value was observed increased (14.480±0.340) which is highly significant (P<0.001) and compared with outside PFZ (12.949±0.340) in the month of March-April. The glycogen of the female ovary from within PFZ was noticed (13.913±0.259) which is highly significant (P<0.001) and comparatively data analysis from outside PFZ (12.638±0.177) during Nov-Dec. The glycogen in the female ovary from within PFZ was observed as (14.622±0.436) which is non-significant (P<0.05) and outside PFZ (13.658±0.298) respectively in March-April.

Liver: The glycogen in the male liver from within PFZ value was showed (15.331±0.255) which is highly significant (P<0.001) and comparative study from outside PFZ (14.112±0.177) in Nov-Dec. whereas from within PFZ the male liver glycogen was (15.785±0.214) which is highly significant (P<0.001) and study from outside PFZ area (14.480±0.340) during March-April. The glycogen in the female liver from within PFZ showed (16.068±0.214) which is highly significant (P<0.001) while in outside PFZ (14.396±0.225) in Nov-Dec. The glycogen in the female liver from within PFZ was observed (15.558±0.343) which is non-significant (P<0.05) and from outside PFZ (14.509±0.298) in March-April.

Lipid content from Parastromateus niger from Mirkarwada

Muscle: The lipid content in the male muscle within PFZ value (5.972±0.281) was observed which is highly significant (P<0.001) whereas from outside PFZ showed somewhat dwindled (4.106±0.243) in Nov-Dec. respectively. Slightly increase in male muscle lipid from within PFZ value was (6.703±0.371) which is non-significant (P>0.05) & comparative analysis from outside PFZ (5.323±0.486) in the month of March-April. The lipid in the female muscle from within PFZ value was represented (6.540±0.243) which is non-significant (P>0.05) study from data analysis for outside PFZ (5.648±0.281) in Nov-Dec. The lipid in the female muscle from within PFZ value was somewhat increased to (6.865±0.140) which is non-significant (P>0.05) and study from outside PFZ value showed (6.054±0.243) during March-April.

Gonad: The lipid in the male testis from within PFZ was observed (7.758±0.486) which is non-significant (P>0.05) and outside (7.190±0.506) in Nov-Dec. The lipid in the male testis for within PFZ value was observed increased (9.056±0.371) which is non-significant (P<0.05) and outside (7.758±0.486) in the month of March-April. The lipid of the female ovary from within PFZ was noticed (8.488±0.243) which is non-significant (P<0.05) and study from outside PFZ (7.027±0.243) during Nov-Dec. The lipid in the female ovary from within PFZ was observed as (9.786±0.371) which is non-significant (P<0.05) and outside (8.082±0.281) respectively in March-April.

Liver: The lipid in the male liver from within PFZ value was showed (3.132±0.243) which is less significant (P<0.01) and outside (2.077±0.281) in Nov-Dec. whereas from within PFZ the male liver content of lipid was (3.944±0.743) which is non-significant (P>0.05) and when compared with outside PFZ (3.213±0.371) during March-April. The lipid in the female liver from within PFZ showed (3.619±0.243) which is non-significant (P>0.05) while in outside PFZ (3.376±0.486) in Nov-Dec. The lipid in the liver from female within PFZ was observed (4.593±0.243) which is non-significant (P>0.05) and from outside PFZ (3.863±0.486) in March-April.

Lipid content from Parastromateus niger from Harnai

Muscle: The lipid in the male muscle within PFZ value (6.054±0.243) was observed which is less significant (P<0.01)

Table 5. Lipid content of *P. niger* during November-December

Tissue	Sex	Mirkarwada		Harnai		Sakhari-Natye	
		Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ
Muscle		5.972	4.106	6.054	4.674	3.781	3.132
	Male	0.281	0.243	0.243	0.506	0.371	0.243
		***		**		ns	
		6.540	5.648	6.054	4.755	6.378	5.323
	Female	0.243	0.281	0.243	0.281	0.612	0.486
		ns		*		ns	
Gonad		7.758	7.190	6.297	5.404	5.891	4.674
	Male	0.486	0.506	0.243	0.140	0.506	0.506
		ns		ns		*	
		8.488	7.027	8.813	7.108	8.731	7.271
	Female	0.243	0.243	0.612	0.371	0.486	0.486
		*		**		*	
Liver		3.132	2.077	3.700	3.132	2.240	1.591
	Male	0.243	0.281	0.371	0.243	0.281	0.140
		**		ns		ns	
		3.619	3.376	3.781	3.376	2.483	1.347
	Female	0.243	0.486	0.854	0.486	0.506	0.371
		Ns		Ns		ns	

Mean value of 3 sample size with ± SD, *= P<0.05, **= P<0.01,***= P<0.001, ns= P> 0.05 non- significant

Table 6. Lipid content of *P. niger* during March-April

Tissue	Sex	Mirkarwada		Harnai		Sakhari-Natye	
		Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ	Within PFZ	Outside-PFZ
Muscle		6.703	5.323	6.540	5.486	6.378	5.242
	Male	0.371	0.486	0.243	0.371	0.612	0.854
		ns		ns		ns	
		6.865	6.054	6.946	5.729	6.540	5.080
	Female	0.140	0.243	0.371	0.371	0.421	0.644
		Ns		*		**	
Gonad		9.056	7.758	7.19	6.054	6.946	5.242
	Male	0.371	0.486	0.371	0.243	0.371	0.506
		*		*		**	
		9.786	8.082	10.03	8.894	9.786	8.245
	Female	0.371	0.281	0.782	0.612	0.612	0.486
		*		Ns		*	
Liver		3.944	3.213	4.106	3.132	3.376	2.970
	Male	0.743	0.371	0.421	0.243	0.486	0.140
		ns		ns		ns	
		4.593	3.863	4.593	4.187	4.755	3.863
	Female	0.243	0.486	0.644	0.281	0.506	0.486
		ns		ns		ns	

Mean value of 3 sample size with ± SD, *= P<0.05, **= P<0.01,***= P<0.001, ns= P> 0.05 non- significant

whereas from outside PFZ showed (4.674±0.506) in Nov-Dec. respectively. Increase in male muscle protein from within PFZ value was (6.540±0.243) which is non-significant (P>0.05) and outside (5.486±0.371) in the month of March-April. The lipid in the female muscle from within PFZ value was represented (6.054±0.243) which is non-significant (P<0.05) and comparative study from outside PFZ (4.755±0.281) in Nov-Dec. The lipid in the female muscle from within PFZ value somewhat increased to (6.946±0.371) which is non-significant (P<0.05) and when compared to outside (5.729±0.371) during March-April.

Gonad: The lipid in the male testis from within PFZ was observed (6.297±0.243) which is non-significant (P>0.05) and outside (5.404±0.140) in Nov-Dec. The lipid in the male testis for within PFZ value was observed (7.19±0.371) which is non-significant (P<0.05) and study from outside PFZ (6.054±0.243) in the month of March-April. The lipid in the female ovary from within PFZ was noticed (8.813±0.612) which is less significant (P<0.01) and outside (7.108±0.371) during Nov-Dec.

The lipid in the female ovary from within PFZ was observed as (10.03±0.782) which is non-significant (P>0.05) and outside (8.894±0.612) respectively in March-April.

Liver: The lipid in the male liver from within PFZ value was showed (3.700±0.371) which is non-significant (P>0.05) and outside (3.132±0.132) in Nov-Dec. whereas slightly increased from within PFZ the male liver content of lipid was (4.106±0.421) which is non-significant (P>0.05) and outside (3.132±0.243) during March-April. The lipid in the female liver from within PFZ showed (3.781±0.854) which is non-significant (P>0.05) while for outside PFZ (3.376±0.486) in Nov-Dec. The lipid in the female liver increased from within PFZ was observed (4.593±0.644) which is non-significant (P>0.05) and from outside PFZ (4.187±0.281) in March-April.

Lipid content from Parastromateus niger from Sakhri-Natye

Muscle: The lipid in the male muscle within PFZ value (3.781±0.371) was observed which is non-significant (P>0.05)

Fig.1 Lipid content in *P. niger* during November-December at Mirkarwada

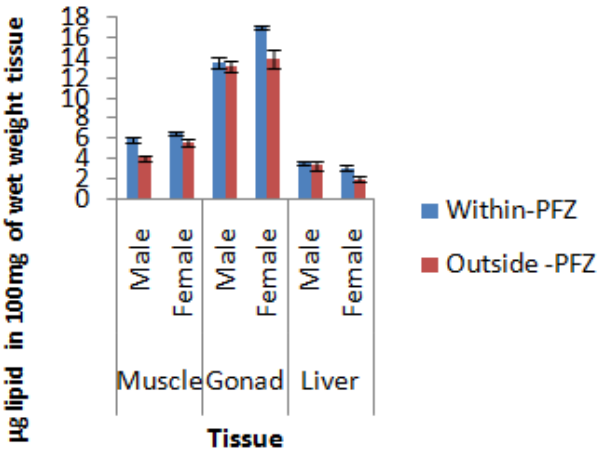


Fig.2 Lipid content in *P. niger* during March-April at Mirkarwada

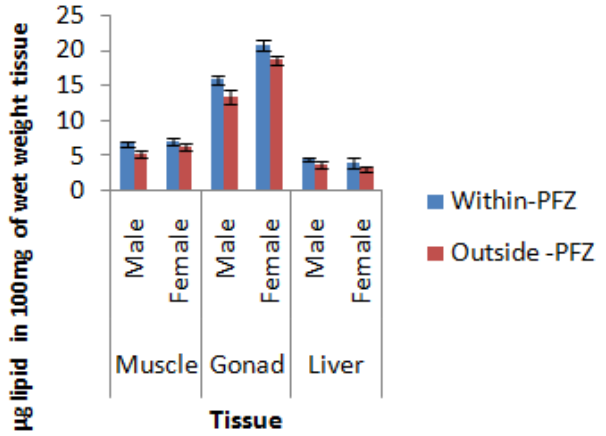


Fig. 3 Lipid content in *P. niger* during November-December at Harnai

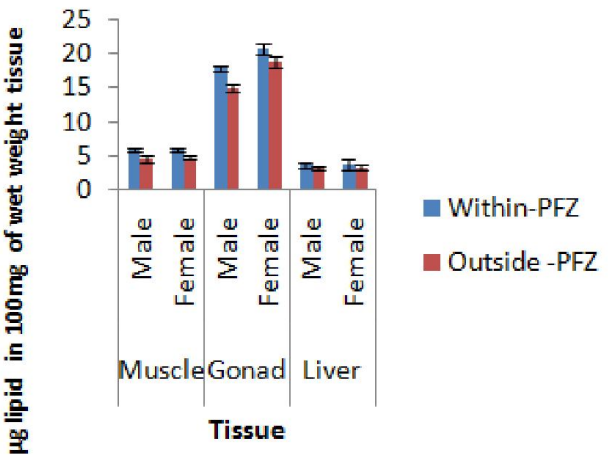


Fig. 4 Lipid content in *P. niger* during March-April at Harnai

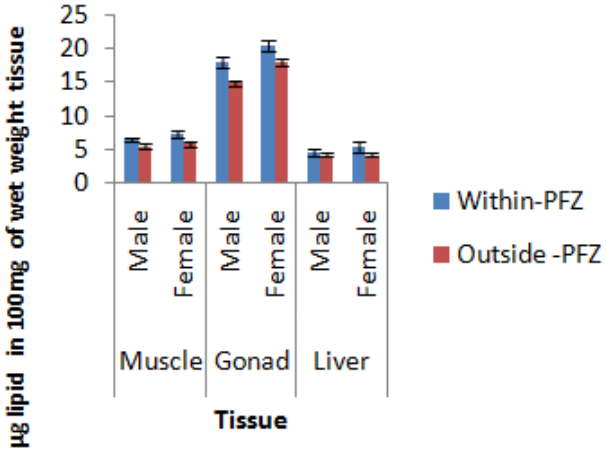


Fig. 5 Lipid content in *P. niger* during November-December at Sakhri-Natye

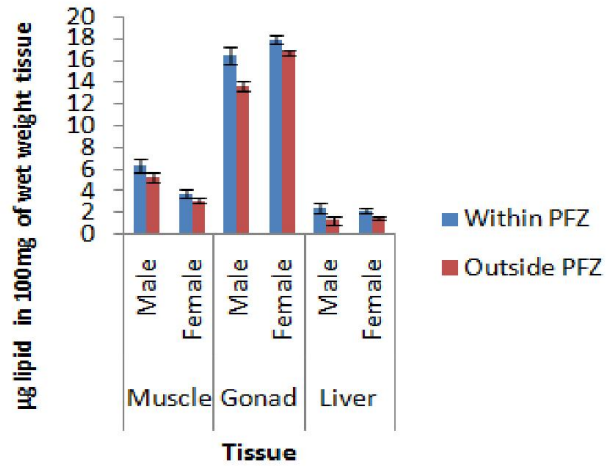
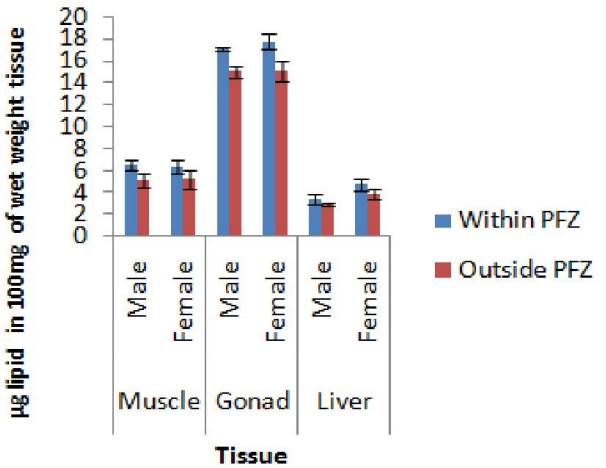


Fig.6 Lipid content in *P. niger* during March-April at Sakhri-Natye



whereas from outside PFZ showed somewhat dwindled (3.132±0.243) in Nov-Dec. respectively. An increase in male muscle lipid from within PFZ value was increased (6.378±0.612) which is non-significant (P>0.05) and comparative study from outside PFZ (5.242±0.854) in the month of March-April. The lipid in the female muscle from within PFZ value was represented (6.378±0.612) which is non-significant (P>0.05) and study from outside PFZ (5.323±0.486) in Nov-Dec. The lipid in the female muscle from within PFZ value was increased to (6.540±0.421) which is less significant (P<0.01) and comparative study outside PFZ (5.080±0.644) during March-April.

Gonad: The lipid in the male testis from within PFZ was observed (5.891±0.506) which is non-significant (P<0.05) and comparative analysis from outside PFZ (4.674±0.506) in Nov-Dec. The lipid in the male testis for within PFZ value was observed increased (6.946±0.371) which is less significant (P<0.01) and analysis from outside PFZ (5.242±0.506) in the month of March-April. The lipid content of the female ovary have been increased from within PFZ was noticed (8.731±0.486) which is non-significant (P<0.05) and study from outside PFZ (7.271±0.486) during Nov-Dec. The lipid in the female ovary from within PFZ was observed as increased (9.786±0.612) which is non-significant (P<0.05) and from comparative outside PFZ (8.245±0.486) respectively in March-April.

Liver: The lipid in the male liver from within PFZ value was showed (2.240±0.281) which is non-significant (P>0.05) and outside (1.591±0.140) in Nov-Dec. whereas from within PFZ the male liver content of lipid was expressed (3.376±0.486) which is non-significant (P>0.05) and comparatively analysis from outside PFZ (2.970±0.140) during March-April. The lipid in the female liver from within PFZ showed (2.483±0.506) which is non-significant (P>0.05) while in outside PFZ (1.347±0.371) in Nov-Dec. The lipid in the female liver increased from within PFZ was observed (4.755±0.506) which is non-significant (P>0.05) and from outside PFZ study (3.863±0.486) in March-April.

DISCUSSION

The study reveals that PFZ advisory is in fact proving benefits to purse-seine than trawls for capture the pelagic as well as demersal fish species followed by gill- net. An exhaustive analysis has been carried out from the fishing boat hired from three major fish landing centers viz. Harnai, Mirkarwada and Sakhari-Natye off Ratnagiri coast for going within and outside PFZ zones. The total fish catch may be variable between within and outside PFZ fish catch because ultimately catch per unit effort depends upon total fish catch at the major different landing centers. The present study gives an account of the fish abundance and depth wise captured fishery resources in different gears with estimates of their potential yields for the Ratnagiri district coast from within and outside PFZ realms. Trawl net off Ratnagiri has been found to be materializing in the exploitation of the pomfret fishery which is mostly found beside pelagic region. An actual halieutic activity initiate from September to May along the entire coast. Different validations were made with different fishing hauling operation for a total catch of pomfret. Fish catch caught per day during validation in both within and outside PFZ are encountered very less of three pomfret. Different areas in the sea have been fished. The boats utilized in PFZ and outside PFZ vessels being of the more or less in same size specifications, the total fish catch data were recorded together and analyzed for the validated individual pomfret fish groups. In regard to depth-wise distribution of different categories of pomfrets fishes it has been found that the occurred fairly high in all shallower depth zones up to 20 meters and also in deeper waters of 30-40 meters.

Conclusion

In addition, the principal benefit to both rural and urban poor consumers in the konkan region should come in the form of improved nutrition through marine fisheries. Both the groups might similarly benefit from the creation of additional employment opportunities in marine fishery realm. Significant benefits could also accrue through a more optimal use of present fishery resources and technology. Research and extension work in this region might provide motivation for increased entry into modern fishery technology and a greater supply of wild stocks. The measure of the resulting scientific contributions to applications is best judged from the high volume of current marine scientific data being created by INCOIS-DOD. An effort should be put into intensifying the validation campaigns and acquiring real-time feedback from fishing vessels is an imperative. All the calculations are carried out by One Way ANOVA covariance analysis study.

Acknowledgement

I would like to thank Ex-Director, Dr. Mane U.H., Center for Coastal and Marine Biodiversity, Dr. Babasaheb Ambedkar Marathwada University, Ratnagiri for his candid help and scientific support in the analysis of biochemical composition. I am also thankful to the Indian National Center for Ocean Information Services (INCOIS), Ministry of Earth Sciences; Government of India supported for this study through PFZ-Mission Project to the first author as SRF.

REFERENCES

Kulkarni, G.M., S. Kemparaju, M. Mohan, U. Bhat and C. Puranhhara. 1991. On an unusually heavy catch of black pomfret, *Formio niger* by purse seine along Dakshina Kannada coast. Indian Council of Agricultural Research. Marine Fisheries Information Service. Technical and Extension Series 114: 34-48.

Pati, S. 1983. Observations on the biology and fishery of black pomfret, *Parastromateus niger* (Bloch) from the Bay of Bengal. *Acta Ichthyologia et Piscatoria* 13: 63-74.

Rao, S. 1973. Observations on the biology of *Parastromateus niger* (Bloch) and *Pampus chinensis* (Euphrasen) from the Godavary Estuary. *Journal of the Inland Fisheries Society of India* 4:207-209.

Sivaprakasam, T.E. 1965. Observations on the maturation and spawning of the brown pomfret, *Parastromateus niger* (Bloch) in Saurashtra waters. *Journal of the Bombay Natural History Society* 62: 245-253.

****