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PARASITES SPECTRUM OF CICHLID SPECIES IN THE LOWER CROSS RIVER AT ITU, AKWA IBOM STATE, NIGERIA

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Abstract: The parasites spectrum of 8 Cichlid species landed at the lower Cross River at Itu was conducted between October 2006 to September 2007. A total of 714 Cichlid fishes were examined for species composition, sex ratio and parasites for a period of 12 months. Eight species of Cichlids were encountered out of which the most abundant was *Tilapia zillii,* 204 (28.57%) followed by *Hemichromis fasciataus*, 116 (16.25), *Tilapia mariae* 114 (15.9%), *Oreochromis niloticus* 96(13.45%), Tilapia guineensis 76(8.89), *Sarotherodon galilaeus* 64(8.96%), *Oreochromis aureus* 42(5.88%) and *Chromidotilapia guntheri* 2 (0.28%). The population of males was significantly higher (χ^2 = 15.756, P < 0.05, df = 1) than that of females. For the parasite spectrum, 246 (34.45%) out of the 714 fishes were infested with parasites. The most abundant parasites in order of prevalence were Copepod 110 (44.71%), Nematode, 102 (41.46%), Bacteria 22 (8.94%) and Acanthocephala 12(4.87%). The effect of parasites on the fishes are enormous, including causing diseases and wounds, reduction in fish growth and reduction in market values of fishes. The implications of fish parasites in public health are discussed. The recommendations for elimination of diseases and parasites and other setbacks to fish farming if strictly followed can bring about a boost in fish production in Nigeria.

INTRODUCTION

Many species of the family Cichlidae (generally known as Tilapia) are a major protein source in many developing countries, particularly in Africa where they are endemic. They form a significant component of many inland fisheries in Nigeria. All Tilapia, in the broad sense, have in common a mainly herbivorous diet, and are therefore only one step from the primary producers (plants) [(1)].

The Cichlids by virtue of their position at the apex of the predator-prey pyramid in the fresh water habitat are among the most parasitized of all vertebrate groups.

Studies on intensively cultured and wild Tilapia have shown that although they are more resistant to diseases than a wide range of disease problems which can occur [(4)]. However, in Nigeria, not much work has been done on the parasitic fauna of the local fishes, including the Cichlidae. This survey of the parasite spectrum of the Cichlid species in the lower Cross River at Itu, Akwa Ibom State, is the preliminary report in the area and will invariably add to the work done on fish parasites elsewhere in Nigeria.

MATERIALS AND METHODS

The study area is the freshwater of the lower Cross River tributaries, at Itu which lies in the tropical rains forest belt in Akwa Ibom State South Southern Nigeria. It is located between longitude 7° 58" to 8° 1" E and latitude 5 ° 7" N to 5 ° 9'N'. It is a small port where artisanal

fishers bring their fish for sale. The Cross River basin covers an area of 70,000km^2 of which 50,000km^2 is in Nigeria. The samples were collected at Esuk Nyayan from fishers who employed various traditional gears such as cast nets and traps. A total of 714 specimens of Cichlid species were collected between October 2006 – September 2007 from catches landed by artisanal fishers at Esuk Nyayan in Itu Local Government Area.

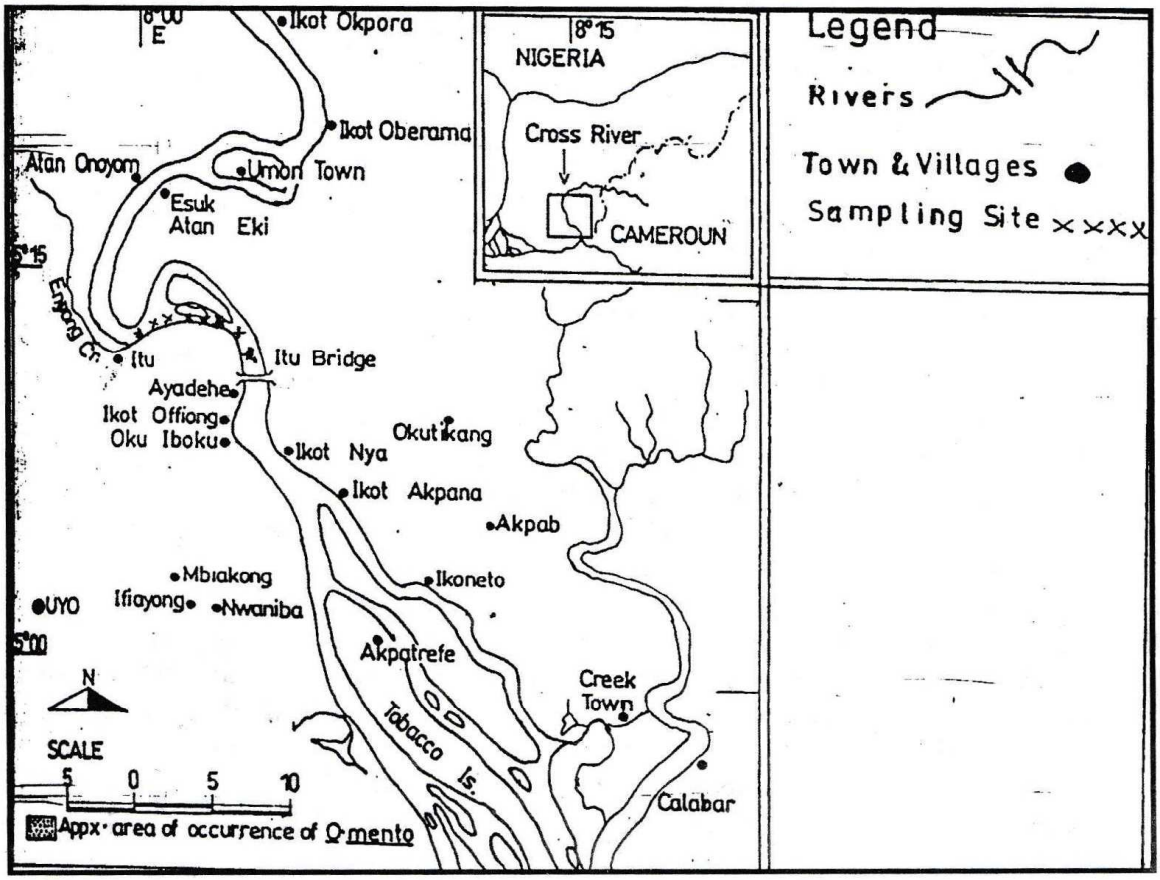

Figure 1: Map of the Lower Cross River Tributaries at Itu

Each specimen was examined for identification and sex determination using such parameters as size, colour, and the keys [5]. The skin, gill and fins were examined with hand lens for external parasites. The total and standard lengths of each specimen were measured to the nearest 0.1cm using measuring board and total body weights were recorded to the nearest 0.01gm using electronic balance (Scout Prosper 402 model). Consequently, the fishes were dissected and the different portions of the gut (mouth, esophagus, stomach, intestines) were examined for endoparasites.

Extraction of the parasites was done with the aid of camel hair brush and pin after rinsing the sections of the gut in saline solution contained in petri dishes. Parasites were examined using 10 and 40x magnification of a binocular light microscope and were identified from taxonomic keys and descriptions [6, 7, 8].
The parasites were preserved in bottles or vials duly labeled, indicating the name of the host's serial number, date of collection and region of the fish from which the parasites were collected.

RESULTS

No ectoparasites were observed in any of the fish. A total of 714 Cichlid fishes belonging to eight species and four genera were encountered (Table 1).

Table 1: Species of Cichlids obtained for the study.

Months	Oct	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	No. Examined	% Occurrence
Species														
Oreochromis niloticus	8	4	4	10	12	4	6	14	8	8	12	6	96	13.45
Sarotherodon galilaeus	10	4	4	2	4	-	2	4	4	4	5	21	64	8.96
Tilapia mariae	-	4	10	12	18	6	4	14	10	8	-	28	114	15.97
Tilapia zillii	28	30	16	26	10	6	8	18	8	24	12	18	204	28.57
Hemichromis fasciastus	8	18	16	10	16	6	8	6	4	4	12	8	116	16.25
Tilapia quineensis	15	4	6	8	6	4	2	12	6	4	7	-	76	10.64
Oreochromis aureus	6	2	4	4	4	4	4	4	6	4	-	-	42	5.88
Chromidotilapia guntheri	-	-	-	-	-	-	-	-	-	-	-	2	2	0.28
Total	77	66	60	72	70	30	34	72	46	56	48	83	714	100

The most abundant was *Tilapia zillii* 204 (28.57%, followed by *Hemichromis fasciatus* 116 (16.25%), *Tilapia mariae* 114 (15.9%), *Oreochromis niloticus* 96 (13.45%) *Tilapia guineensis* 76 (88.9%) *Sarotherodon galilaeus* 64 (8.96%), *Oreochromis aureus* 42 (5.88%) and *Chromidotilapia guntheri* 2 (0.28%).

Table 2: Distribution of Cichlids species according to sex

	Oreochromis niloticus		*Sarotherodon galilaeus*		*Tilapia mariae*		*Tilipia zillii*		*Hemichromis fasciatus*		*Chromido-tilapia guntheri*		*Tilipia guineensis*		*Oreochromis aureus*		*Total*
Months	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
October	6	2	8	2	-	-	16	12	6	2	-	-	10	5	4	2	75
November	2	2	2	2	2	2	12	18	8	10	-	-	2	2	2	-	70
December	2	2	2	2	6	4	10	6	6	10	-	-	4	2	2	2	58
January	8	2	2	-	8	4	16	10	4	6	-	-	2	6	2	2	72
February	6	6	2	2	12	6	6	4	10	6	-	-	2	4	2	2	70
March	2	2	-	-	4	2	4	2	4	2	-	-	2	2	4	-	30
April	4	2	2	-	2	2	6	2	6	2	-	-	2	-	2	2	32
May	8	6	2	2	8	6	14	4	4	2	-	-	8	4	2	2	72
June	4	4	2	2	6	4	6	2	2	2	-	-	4	2	4	2	52
July	6	2	2	2	4	4	14	10	2	2	-	-	2	2	4	-	56
August	8	4	3	2	-	-	8	4	8	4		-	4	3	-	-	55
September	4	2	17	4	16	12	8	10	6	2	2	-	-	-	-	-	72
	60	36	44	20	68	46	120	84	66	50	2		42	32	28	14	714

Table 3: Pooled sex ratios for Cichlids species.

	Male	Female	Ratio	Cal χ^2 - test
Oreochromis niloticus	60	36	1:0.81	3.00
Tilapia zillii	120	84	1:0.70	3.20
Tilapia mariae	68	46	1:0.68	2.12
Saratherodon galilaeus	44	20	1:0.45	4.50
Hemichromis fasciatus	66	50	1:0.76	1.10
Oreochromis aureus	28	14	1:0.50	2.24
Tilapia guineensis	44	32	1:0.73	0.95
Chromidotilapia guntheri	2	-	1:0.00	0.00
Total	132	282	1:0.65	15.756

The results in Tables 2 and 3 indicate that the population of the males was significantly higher ($\chi^2 = 15.756$, $P < 0.05$, df -1) than that of the females.

Table 4: Prevalence of parasite species on different fish species

S/n	Fish Species	No. of Fish examined	No. of fish infected	Prevalence of different parasite				% of parasitic infection
				Copepod	Nematode	Bacteria	Acanthoc e phalan	
1	*Oreochromis niloticus*	96	38	10	18	6	4	39.58
2	*Sarotherodon galilaeus*	64	26	4	14	6	2	40.63
3	*Tilapia mariae*	114	30	20	10	-	-	26.32
4	*Tilapia zillii*	204	62	40	18	2	2	30.39
5	*Hemichromis fasciatus*	116	42	20	16	4	2	36.21
6	*Tilapia guineensis*	76	32	10	16	4	2	42.11
7	*Tilapia aureus*	42	16	6	10	-	-	38.10
8	*Chromidotilapia guntheri*	2	-	-	-	-		0
		714	123	110	102	22	12	34.45%

Table 5: Incidence (%) of the different classes and species of parasites

Copepods	No	%	Nematode	No	%	Bacteria	No	%	Acantho-cephala	No	%
Ergasilus latus	*86*	*78.18*	*Capillaria* sp	*58*	*56.86*	*Aeromo-nas sp*	*13*	*59.09*	*Serasetis* sp	*12*	*100*
Lernaea sp	24	21.82	*Asfpions* larvae	32	31.37	*Pseudo-monas*	7	31.81			
			Metabro-neium sp	12	11.76	*Fledbact-er column-aris*	2	9.09			
Total	110	100	Total	102	100	Total	22	100	Total	12	100

The result in Tables 4 and 5 indicates that out of 714 fishes examined, 246 (34.45%) were infected with parasites. There was no significant difference in percentage of parasite infection among the various Cichlid species except for the absence of parasites in *Chromidotilapia guntheri*. The most abundant parasites were Copepods 110, (44.71%), followed by Nematodes 102 (41.46%), Bacteria 22 (8.94%) and *Acanthocephala* 12 (4.87%).

There was no significant difference ($p > 0.05$) in monthly parasite infection in any of the Cichlid species (Fig.2a - g).

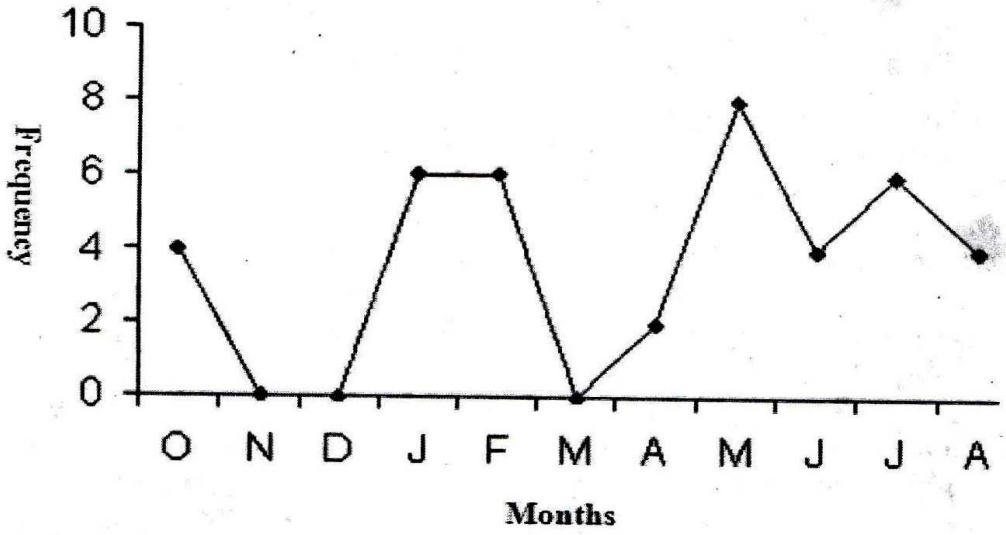

Fig.2.1a: Monthly frequency of parasites in *Oreochromis niloticus*

The result in Figure 2.1a shows that the highest level of parasitic infection in *Oreochromis niloticus* was in the month of May with 7 (50%) fishes being infected out of 14 fishes captured. The months of November, December and March recorded no infection.

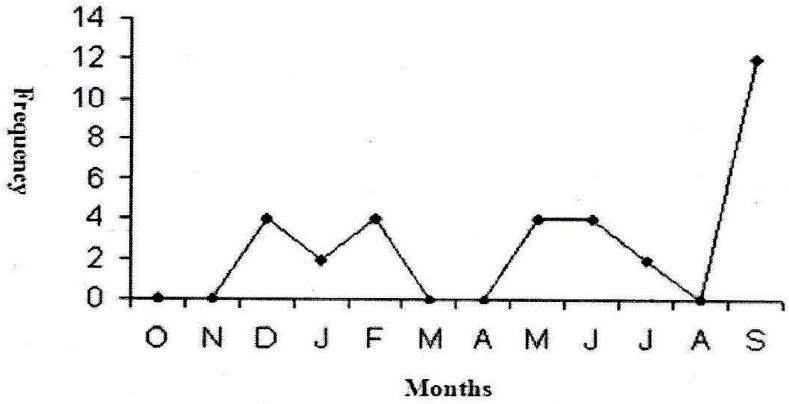

Fig.2.1b: Monthly frequency of parasites in *Sarotherodon galilaeus*

With respect to parasitic infection of *Sarotherodon galilaeus*, (Fig. 2.1b) the infection rate was at its peak in the month of September with 8 (80%) out of the 10 fishes being infected while in the months of October, November March and April there were no parasitic infection.

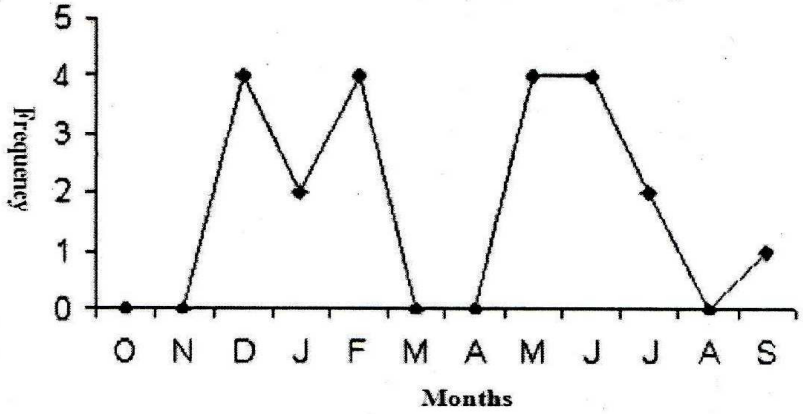

Fig.2.1c: Monthly frequency of parasites in *Tilapia mariae*

The result in Figure 2.1c indicates that the parasitic infection of *Tilapia mariae* was at its peak in the month of September with 6 (21.4%) fishes being infected whereas none of the fishes was infected in the months of October, November, March, April and August.

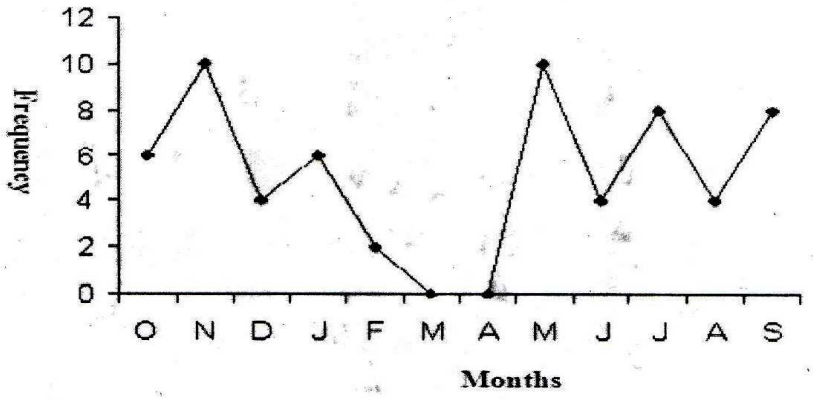

Fig.2.1d: Monthly frequency of parasites in *Tilapia zillii*

The result in Figure 2.1d shows that parasitic infection of *Tilapia zillii* was at its peak in the months of November and May with 10 fishes being infected in each month out of 30 and 18 fishes captured respectively while the months of March and April recorded no infection.

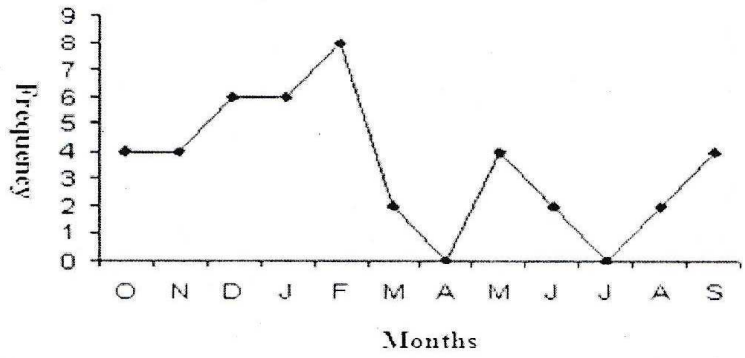

Fig.2.1e: Monthly frequency of parasites in *Hemichromis fasciatu*

The result in Figure 2.1e shows that *Hemichromis fasciatus* recorded highest level of parasitic infection in the month of February with 8 (50%) out of 16 fishes being infected and there was no infection in the month of April.

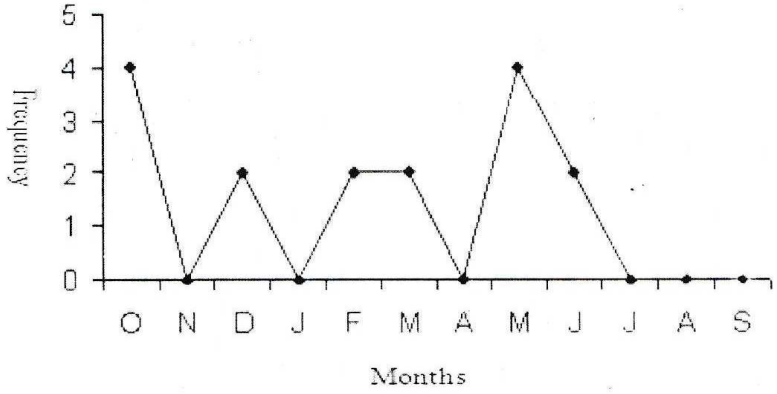

Fig.2.1f: Monthly frequency of parasites in *Tilapia guineensis*

The result in Figure 2.1f shows that the infection of *Tilapia guineensis* was at its peak in the month of October and May with 4 fishes infected in each month and there were no parasitic infections in the months of November, January, April, July August and September.

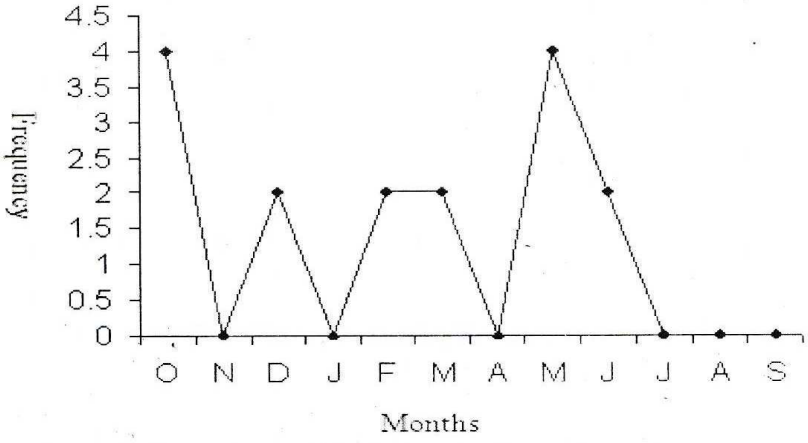

Fig.2.1g: Monthly frequency of parasites in *Oreochromis aureus*

The result in Fig 2.1g shows that parasitic infection of *Oreochromis aureus* was at its peak in October and May and there was no infection in November, January, April, July, August and September.

The species diversity of the parasites (Table 5) shows that there were 3 species of nematodes, namely; (*Capillaria* sp 58 (56.86%), *Eustrongyloides africanus* larvae 32 (31.37%) and *Metabroneium sp* 12 (1.76), *Bacteria* 3 species, *Aeromones sp,* 13 (59.09%), *Pseudomonas* sp 7 (31.81%) and *Fledbacter columnaris* 2 (9.09%), Copepods; 2 species, *Ergasilus catus* 86 (78.18%) and *Lernaea* sp 24 (21.81%) Acanthocephala; 1 species *Serasentis* sp 12 (100%).

DISCUSSION

The Cichlids feed on phytoplankton, detritus and aquatic macrophytes. These sources constitute part of their diet from where the fishes might pick up infective larval stages and adult parasites. Therefore, the incidence and intensity of infection may be as a result of their foods and feeding habit, availability and contact with infective stages of the parasite as previously reported by (9). Copepods in many fishes may be accumulated as a result of feeding and respiration[10]. During respiration in fishes, the mouth opens to gulp water which passes over the gills, copepods in the water are trapped by the gill rakers and are returned to the gut [11]. Similarly, nematodes could be picked up along with detritus due to its abundance in the habitats of the fish as previously confirmed [12, 13, 14, 15]. However, the polluted surface waters may affect the distribution and prevalence of the *Eustrogyloides* nematode [16].

The Acanthocephalid worm *Serasentis* species were found in the gills and upper region of the gut due to its spine. It causes intestinal pathology and open wounds for secondary infection by bacteria [17].

The variation in level of parasitic infection among the cichlid species (Fig.2.1a – g) shows fluctuation in population of the parasite. During the period, most of the Cichlid species had the highest level of infection during the rainy season (May to October). This may be as a result of increase in incidences of parasites being washed into the water by runoff. The various peaks of the parasitic infection of different species is a reflection of abundance of the parasite during such period.

CONCLUSION

Many fish diseases including those caused by parasites are as a result of, or are enhanced by poor environmental condition. The effect of parasites on fishes and environs range from depriving the fish of its nutrients, causing disease and wounds which open new avenues for the establishment of other diseases, and low reproductive capacity. The overall effect causes reduction in fish production and market value of fishes. Therefore, the elimination of the diseases and parasites and other setbacks associated with fish farming means a boost in fish production in Nigeria and Africa in general.

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