Journal of Fisheries and Aquaculture, ISSN: 0976–9927 & E-ISSN: 0976–9935
Vol 1, Issue 1, 2010, PP-01-07

# Survey of helminth parasites in freshwater fishes from Marathwada region, MS, India

**Jaywant Dhole, Sushil Jawale, Somnath Waghmare and Ramrao Chavan**
Department of Zoology, Dr. B.A.M. University, Aurangabad, MS, India

**Abstract-** The present study deals with the survey of helminth parasites from Marathwada region (M. S.) India, during July 2008 to June 2009 this report summarizes the data of incidence, intensity and density of infection of helminth parasites in freshwater fishes in relation to environmental factors. Fish samples were collected from four main localities i.e. Osmanabad, Aurangabad, Latur and Nanded in Marathwada region examined for helminth parasites included three classes i.e. Cestode, Trematode and Nematode. During the present study 879 fishes were examined, in which 487 fishes were infected with seven genera of helminth parasites among these four were cestodes, two were trematodes and one was nematode. The present studies are helpful for the status of diversity of helminth parasites from Marathwada region
**Key-word:**Survey, Helminth parasites, Freshwater fishes, Environmental factor, Marathwada.

## Introduction

India is the third largest producer of fish in the world and second in inland Fish production**.** Fisheries are important for the Indian economy as it provides employment opportunities, is a source of nutritional food and foreign exchange earning. The total fish production is 6.4 Million Metric Tonnes (mmt) of which 3.4 mmt is inland and 3.0 mmt is marine production but fish farming remains a high risk investment, mainly due to the disease problems caused by parasitic infections. The survey of helminth parasites in freshwater fishes was undertaken to investigate the internal helminth parasitic environment of the host and the environmental factor such as season, temperature, humidity, age of the host. The common parasites of fishes causing the economic losses includes the helminth parasites like *Senga* Dollfus (1964), *Diphyllobothrium* (1758), *Lytocestus* Cohn, (1908), *Spinitectus* Fourment, (1883). However, very little is known about the parasitic fauna of fishes of the India in comparison with the information available from other regions of the continent. Fishes are host to many adult helminth parasites and larval forms, the adult of which occur in amphibians, reptiles, birds and mammals as well as predatory fish. The strict dependence of the parasite on its host and the exploitation of the latter by the former provide a useful research model in the field of ecology and evolutionary biology. Several investigations have studied helminth parasites of freshwater fishes. Through the work of these investigation concerning the survey, population dynamics, host specificity, organ specificity. Therefore one objective of this study was to determine monthly incidence of infection; variation in intensity of infection and the second was to determine variation in parasite fauna with the diet of the host, variation in infection with the habitat type.

## Material and Method

The freshwater fishes were collected from different places of Marathwada region during the period of July 2008 to June 2009. Fishes were opened up dorso-ventrally and the internal organs examined. The entire digestive system was removed and placed in a Petri dish with physiological saline. Infection of each group of parasites was treated as follows: collected cestodes and trematode were first relaxed and then fixed in hot 4%formalin and stained using Harris haematoxyline. Stained parasites were washed in distilled water, dehydrated in ascending grades of alcohol, cleared in xylene, mounted in D.P.X. Nematodes were fixed in hot 10% Glycerol and cleared in lacto phenol. Drawings were made using a camera lucida. (Francis Weesner 1964). The identification is made with the help of “Systema Helminthum” by Yamaguti (1961).

Population dynamics of helminth parasites were determined by following formulae,

$$\text{1) Incidence of infection} = \frac{\text{Infected host} \times 100}{\text{Total hosts examined}}$$

$$\text{2) Intensity of infection} = \frac{\text{No. of parasites collected in a sample}}{\text{No. of infected host}}$$

$$\text{3) Density of infection} = \frac{\text{No. of parasites collected in a sample}}{\text{Total host examined}}$$

$$\text{4) Index of infection} = \frac{\text{no. of host infected} \times \text{No. of parasite collected}}{\text{Total hosts examined}}$$

## Result and Discussion

The survey was carried out with 879 freshwater fishes in which *Mastacembalus armatus*

(Lecepede, 1800), *Clarius batrachus* (Linnaeus, 1758), *Wallago attu* (Bleaker, 1857) and *Channa punctatus* (Bloch) from various places of Marathwada region. Out of 879 fresh water fishes 487 were infected with helminth parasites in which cestode, trematode and nematode were found in one annual cycle. A total 689 helminth parasites were found during the present investigation. They were belonging with three classes in which total seven genera are found, out of them four from cestode [*Senga* Dollfus, (1934), *Circumoncobothrium* Shinde, (1968), *Lytocestus* Cohn, (1908), *Gangesia* Woodland, (1924)], two from trematode [*Allocreadium* Looss, (1900), *Orientocreadium,* Tubangui, (1931), and one from nematode [*Procamallanus* Baylis, (1923)]. During the present investigation the high rate of infection of cestode and trematode found as compare to nematode parasites. The values for the incidence, intensity, density of infection in Table no.1 whereas the Table no. 2 shows influence of season on parasitic infection of helminth parasites from freshwater fishes. The incidence of infection of cestode and trematode was highest in summer season (41.55%, 23.91%) respectively, while cestode low in winter season (27.95%) and trematode moderate in winter season (9.44%) and but in cestode moderate in rainy season (40.14%,) while trematode least in rainy season (07.06%) but nematode parasites incidence of infection was highest in winter season (13.66%) while moderate in summer season (08.64%) and least in rainy season (0.40%). Regarding the parasitic diversity and population study cestode and trematode indicates abundance population as compare to nematode parasites. This may be due to, development of parasites requires high temperature, low humidity and less rainfall which is the best environment for the growth of parasites except nematode parasites. The valuable information pertaining to the influence of seasons on the helminth parasites was contributed by several workers like Tornqust (1931) who described about the systematic method of occurrence of certain fish parasites *Camallanus lacustus* that the infective stages invade the host during summer, the growth and maturation takes place during autumn and winter release of their infective progeny occurs during summer. Survey of seasonal infection of fish infected with Caryophyllids has been done in other countries by different workers Hanley, Anderson (1976), Karnaev (1960) in carps, Progestrom and Haluorson (1968) in *B.rutilius*. They observed high infection in summer. Kennedy (1976) and Homes (1976) observed the factors such as distribution and environment of the host the diet and mode of feeding, often play important role to limit a parasite to a particular host species, as well as high prevalence occur in particular season. During summer season the manifestation of cestode parasite was highest because of temperature which helps to hatching eggs of parasites and enhances the rate of parasites while as rainy relatively shows very low infection of the parasites. The L. Szidat (1956) he state that “parasites are influenced by the same conditions of specific differentiation and phylogenetic development as free living animals. The only difference is that the they are influenced by the wide external environment surrounding the host, but only by the host itself acting as the environment. The latter produces stimuli which promote further development”(Szidat 1956). This statement is radical contradiction to the following statement by V.A. Dogel (1947), “parasites are also connected by many strong links to the external environment surrounding the host itself”. The second thesis of Soviet parasitology is the study of all parasites inhabiting the host organism, in which they form a certain aggregation, the parasitofauna. V.A. Dogel (1935, 1936, 1947, and 1948) defines the problem confronting ecological parasitology as the study of the dependence of the parasitofauna as a whole on the changes in the external conditions surrounding the host and on changes in the physiological state of the host itself i.e. the environment of the order. This line of study has proved to be extremely fruitful. The infections of *Lytocestus* sp. are observed in only *Clarius batrachus* and *Senga sp, Circumoncobothrium sp.* and *Allocreadium* are heavily found in *Mastacembelus armatus.* The infection of *Senga sp, Orientocreadium sp.* in *Channa punctatus* and while *Gangesia sp, Procamallanus sp. is* found in *Wallago attu,* because of the host specificity. Morphological, physiological and ecological factors play important role in the host specificity. *Senga sp, Circumoncobothrium sp. Gangesia sp*. *Procamallanus sp.* were specifically recovered from intestine *M. armatus* and *W. attu* while *Allocreadium sp.* were recovered from lung only *M. armatus*. *Lytocestus* are recovered from stomach of *C. batrachus* and *Orientocreadium sp. were recovered from* stomach and intestine of *C. punctatus* This suggests that the worms are site specific and probably derive certain

nutrients from the organs. This needs further investigation to establish the reasons for organ specificity. The subject of organ specificity among fish parasites has been reported by various researches for example, William and Jones (1994) reported that host and organ specificity is determined by ecological requirements of the hosts and the parasites. Hosts when they share the same environment and have, for example, similar feeding requirements are likely to harbor parasites which are closely related taxonomically. Another interesting observation during this study was variation in parasitic infection with sampling stations. Although *Mastacembalus armatus* was more infected than the other fish hosts, the intensity of infection of this fish with different parasites varied from one station to another. At Latur and Osmanabad Districts the fish was heavily infected with the cestode and nematode while the other parasites occurred in low numbers or absent. At Aurangabad District, same the fish was heavily infected by the cestode parasites. Noteworthy is the fact that all *Clarius batrachus* and *Channa punctatus* from Nanded Districts did not harbor any nematodes. The above variations can be attributed to changes in physico-chemical parameters or variation in food habits of the host. Among the *Wallago attu* those from Nanded and Latur Districts were observed to be more heavily infected by the nematode. Moller and Anders (1986) concluded that fish from more polluted water tend to harbour more helminth parasites than those from less polluted waters. Polanski (1961a) reported that the main factors determining the variety of parasite fauna as well as the intensity and incidence of infection can be summarized as follows: The diet of the host, lifespan of the host, the mobility of the host throughout its life including the variety of habitats it encounters, its population density and the size attained, large hosts provide more habitats suitable for parasites than do small ones. During this study, *Mastacembalus armatus* which was the most heavily infected was observed to feed mainly on a particular type of zooplankton and other small fishes. Some of these parasites cause diseases to fish, affecting their health and reproduction, making them fall easy prey to predators and some infect man. In fish farming, parasites may lead to epidemics and mortalities, resulting in economic losses (Khalil & Polling, 1997). The purpose of this survey was to estimate the present status of parasite incidence in this region and to provide parasitologic and epidemiologic information.

**Conclusion**

The one year survey has shown that fresh water fishes from the Marathwada region harbor a wide range of parasites especially the helminth parasites. The study has established that the *Mastacembalus armatus* fish is one of the most heavily infected fish species as compare to *Clarius batrachus*, *Wallago attu* and *Channa punctatus*. This study thus highlights on the details of therefore is, the only one that has given some details on the endoparasitic organisms infecting freshwater fish species along the Marathwada region. However, the above study can only be complete if it covers a whole season to investigate the following: Seasonal variation in incidence of infection, variation in intensity of infection, variation in parasite fauna with the diet of the host, variation in infection with the habitat type

**Acknowledgement**

The author is very much thankful to the Head, Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Maharashtra) for providing the laboratory facilities during this work.

**References**

[1] Anderson R.M. (1976) *Parasitology* (72) 281-395

[2] Anderson R.M. and May R. M. (1979) *Nature* 280: 361-367.

[3] Baylis H.A. (1923) *Parasitology, 15, 137-138.*

[4] Cohn (1908) *Bakt. Parasitenk* (46) 134-39

[5] Dollfus R.PH (1934) *Bull. Sac. Zool. France* 69; 476-490

[6] Dogiel V.A. (1985) *Parasitology of fishes. Leningrand university press, Olivear and Boyed, Edinburgh and London*. 1-348

[7] Esch G.W. (1977) *Regulation of parasite population. Academic press, INC, New York* 253.

[8] Kanaev A.I. (1956) *Avaforcefert mosrybutavz*, 137-144

[9] Kennedy C.R. (1976) *Ecological aspects of parasitology North Holland publishing company Amsterdam* 1- 474.

[10] Khalil L. F. and Polling K. (1997) *Checklist of the Helminth Parasites of African Freshwater Fishes. Uni. of the North Department of Zoology. Republic of South Africa* 184.

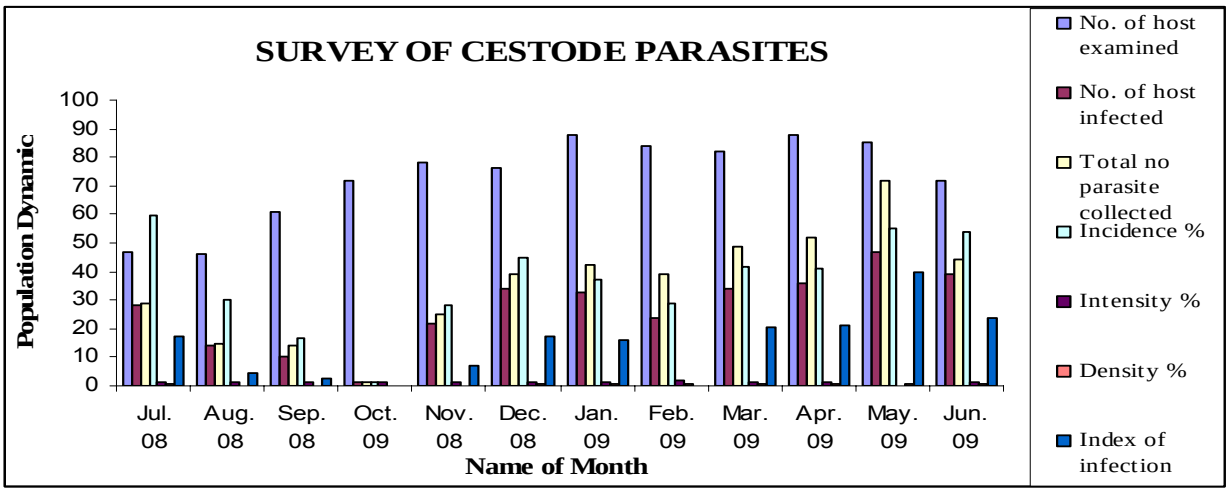
[11] Moller H. And Anders K. (1986) *Kiel: Moller* 365.
[12] Shinde G.B. (1968) *Rivi Di Para* (1912): 111-114.
[13] Shinde Laxmikant et. al (2009) *Ecological study of endoparasites in alimentary canal from Gallus (M.S.) India. Decca c.science*
[14] Thomas J.D. (1964) *J. Animal Ecology*, 33:83-85
[15] Tubangii M. A. (1931) *Philipp. J. Sci. 44: 417 – 424.*
[16] Williams D.D. (1978a) *Lowa State J. Res*. 53(4): 305-310
[17] Williams H, Jones A. (1994) *Parasitic worms of fish, Taylor and Francis,Bristol, UK 593*.
[18] Woodland WNF. (1924) *Parasit* (16): 441-451.
[19] Yamaguti S. (1958) *Systema Helminthum Vol. I The digenic Trematodes of vertebrates. Int. Sci. Pub. New York 1575.*
[20] Yamaguti S. (1961): *Systema Helminthium, vol. II .Cestode of vertebrates, Interscience publishers INC, New York and London,* 1-860.
[21] Yamaguti S. (1961) *Systema Helminthum the nematode of vertebrates. Interscience publishers .INC. New York. And London. Vol. III, Part I and II.*

**Observation: Table No. 1**

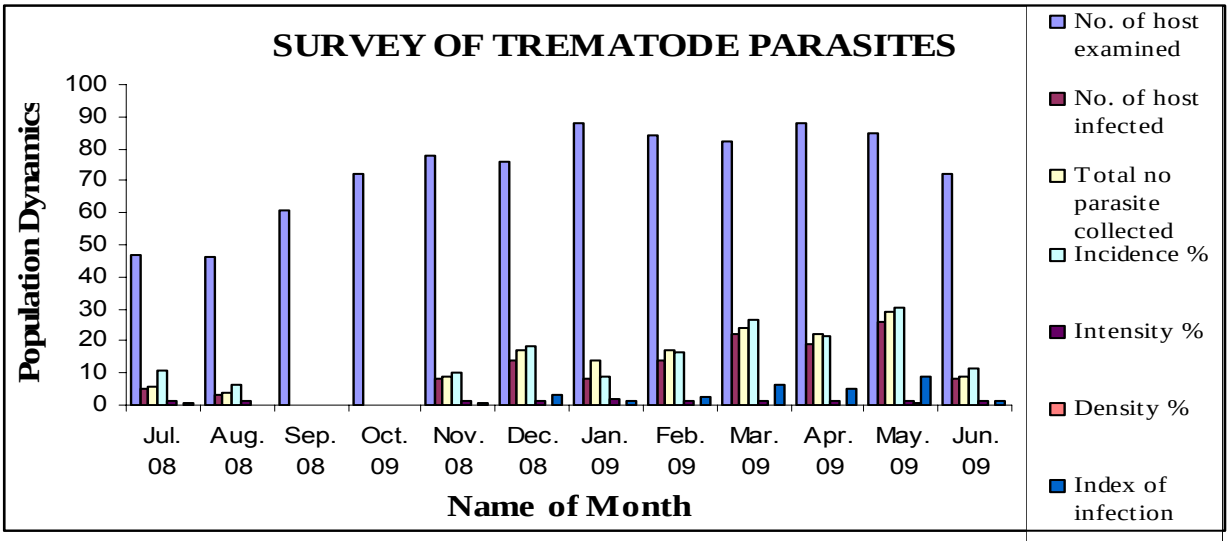
| Month | Name of Parasite | No. of host examined | Total no. of host infected | No. of host infected | Total no parasite collected | Incidence % | Intensity % | Density % | Index of infection | Habitat | Locality |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jul. 2008** | Cestode | 47 | 32 | 28 | 29 | 59.57 | 1.03 | 0.61 | 17.27 | Intestine | Nanded, Latur |
| | Trematode | | | 05 | 06 | 10.63 | 1.2 | 0.12 | 0.63 | Liver | |
| | Nematode | | | 00 | 00 | 00 | 00 | 00 | 00 | ----- | |
| **Aug. 2008** | Cestode | 46 | 17 | 14 | 15 | 30.43 | 1.07 | 0.32 | 4.56 | Intestine | O'bad, A' bad |
| | Trematode | | | 03 | 04 | 06.52 | 1.33 | 0.08 | 0.26 | Liver | |
| | Nematode | | | 00 | 00 | 00 | 00 | 00 | 00 | ---- | |
| **Sep. 2008** | Cestode | 61 | 11 | 10 | 14 | 16.39 | 1.4 | 0.22 | 2.29 | Intestine | A' bad, Latur |
| | Trematode | | | 00 | 00 | 00 | 00 | 00 | 00 | ---- | |
| | Nematode | | | 01 | 02 | 01.63 | 02 | 0.03 | 0.03 | Intestine | |
| **Oct. 2009** | Cestode | 72 | 07 | 01 | 01 | 01.38 | 01 | 0.01 | 0.01 | Intestine | A'bad, Nanded |
| | Trematode | | | 00 | 00 | 00 | 00 | 00 | 00 | ----- | |
| | Nematode | | | 06 | 07 | 08.33 | 1.16 | 0.09 | 0.58 | Stomach | |
| **Nov. 2008** | Cestode | 78 | 34 | 22 | 25 | 28.20 | 1.13 | 0.32 | 7.05 | Intestine | Latur, O' bad |
| | Trematode | | | 08 | 09 | 10.25 | 1.12 | 0.11 | 0.92 | Intestine | |
| | Nematode | | | 06 | 14 | 07.69 | 2.33 | 0.17 | 1.07 | Intestine | |
| **Dec. 2008** | Cestode | 76 | 58 | 34 | 39 | 44.73 | 1.14 | 0.51 | 17.44 | Intestine | Nanded, A' bad |
| | Trematode | | | 14 | 17 | 18.42 | 1.21 | 0.22 | 3.13 | Liver | |
| | Nematode | | | 19 | 31 | 25 | 1.63 | 0.40 | 7.75 | Intestine | |
| **Jan. 2009** | Cestode | 88 | 46 | 33 | 42 | 37.5 | 1.27 | 0.47 | 15.75 | Intestine | Nanded' Latur |
| | Trematode | | | 08 | 14 | 09.09 | 1.75 | 0.15 | 1.27 | Liver | |
| | Nematode | | | 12 | 26 | 13.63 | 2.16 | 0.29 | 3.54 | Intestine | |
| **Feb. 2009** | Cestode | 84 | 52 | 24 | 39 | 28.57 | 1.65 | 0.46 | 0.01 | Stomach | Latur, O' bad |
| | Trematode | | | 14 | 17 | 16.66 | 1.21 | 0.20 | 2.83 | Intestine | |
| | Nematode | | | 19 | 22 | 22.61 | 1.15 | 0.26 | 4.97 | Intestine | |
| **Mar. 2009** | Cestode | 82 | 59 | 34 | 49 | 41.46 | 1.44 | 0.59 | 20.31 | Intestine | O'bad, A' bad |
| | Trematode | | | 22 | 24 | 26.82 | 1.09 | 0.29 | 6.43 | Liver | |
| | Nematode | | | 07 | 10 | 08.53 | 1.42 | 0.12 | 0.85 | Intestine | |
| **Apr. 2009** | Cestode | 88 | 56 | 36 | 52 | 40.90 | 1.44 | 0.59 | 21.27 | Stomach | A'bad, Nanded |
| | Trematode | | | 19 | 22 | 21.59 | 1.15 | 0.25 | 4.75 | Liver | |
| | Nematode | | | 02 | 04 | 02.27 | 02 | 0.04 | 0.09 | Intestine | |
| **May 2009** | Cestode | 85 | 69 | 47 | 72 | 55.29 | 1..53 | 0.84 | 39.81 | Intestine | Nanded, Latur |
| | Trematode | | | 26 | 29 | 30.58 | 1.11 | 0.34 | 8.87 | Liver | |
| | Nematode | | | 01 | 01 | 01.17 | 01 | 0.01 | 0.01 | Intestine | |
| **Jun. 2009** | Cestode | 72 | 46 | 39 | 44 | 54.16 | 1.12 | 0.61 | 23.83 | Intestine | O' bad, Latur |
| | Trematode | | | 08 | 09 | 11.11 | 1.12 | 0.12 | 01 | Liver | |
| | Nematode | | | 00 | 00 | 00 | 00 | 00 | 00 | ---- | |
| **Total** | | **879** | **487** | | **689** | **55.40** | **1.41** | **0.78** | **381.73** | | |

(Note: In this table content two column show infected host because one column shows whole helminth parasites infected host whiles other column infected host shows specific class wise.)

**Graph 1-**




**Graph 2-**




**Graph 3-**

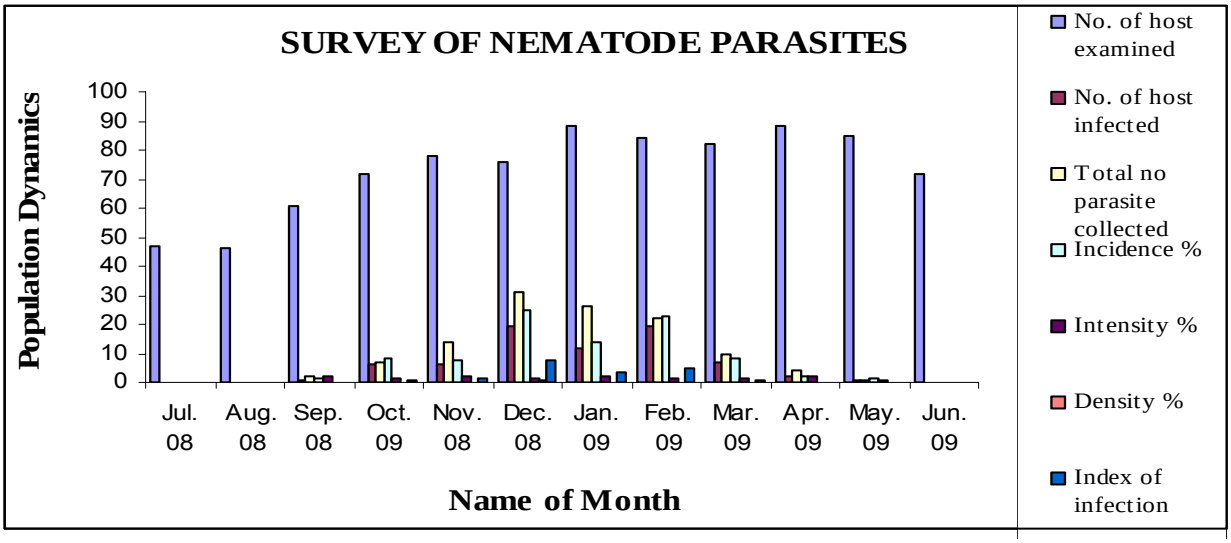
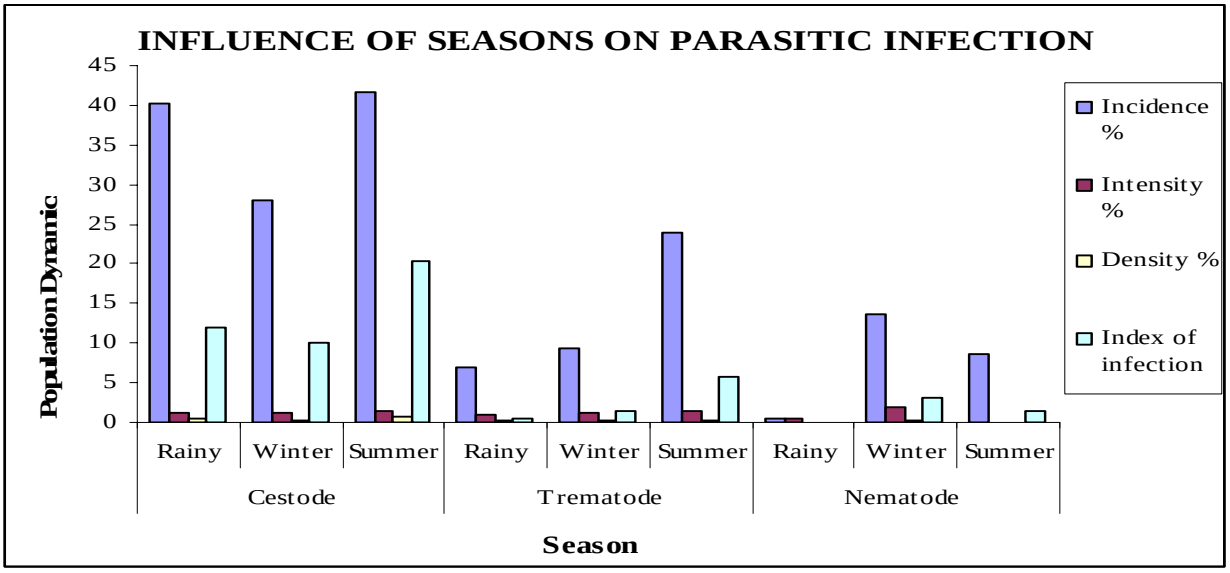


*Table 2-Influence of seasons on parasitic infection*

| Genera | Seasons | Incidence % | Intensity % | Density % | Index of infection |
|---|---|---|---|---|---|
| **Cestode** | Rainy | 40.14 | 01.15 | 0.44 | 11.99 |
| | Winter | 27.95 | 01.13 | | 10.06 |
| | Summer | 41.55 | 01.51 | 0.62 | 20.35 |
| **Trematode** | Rainy | 07.06 | 0.91 | 0.26 | 0.47 |
| | Winter | 09.44 | 01.13 | 0.12 | 01.36 |
| | Summer | 23.91 | 01.34 | 0.27 | 05.72 |
| **Nematode** | Rainy | 0.40 | 0.5 | 0.007 | 0.007 |
| | Winter | 13.66 | 01.82 | 0.23 | 03.23 |
| | Summer | 08.64 | 01..39 | 0.10 | 01.48 |

**Graph 4-**






Journal of Fisheries and Aquaculture, ISSN: 0976–9927 & E-ISSN: 0976–9935, Vol 1, Issue 1, 2010