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Ecologicala Spectsin Relation to Digenean Trematodeparasites in Fresh Water Fish Channa Striatus (BLOCH)

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ABSTRACT

Fishes are found adequately in the different water sources of Jaunpur India. Five rivers (Gomti, Sai,Varuna,Pili and Basuhi) ,Gujar tal and different pond are available here as a aquatic habitat. In research work author consider only two sites of river Gomti and two different ponds in district Jaunpur, U.P. They are external as well as internal .In this studyauthor focused on digenetic trematodes parasites. Digenean trematodes are completing their life cycle in two hosts so both are susceptible to the infection. There are considerable change occur in the environment wih the passage of time. We also know that environmental factors affect the life forms of any place. So it is important to study the different ecological terms in relation to the host and their infectious agents. From ancient time humans beings use large amount of fish food for survival because they are easily available from different water sources. When human beings eat unadequate cooked fish then suffered with food borne tremadiases.So it is important to know the infection level in the fishes.

KEYWORDS :-Parasites, Channa striataus & Ecological parameters.

INTRODUCTION

The property of easily availability ,fishes are attracting the human beings from ancient time to fulfill the need of their food. Now a days fish culture become a industry for a country which have adequate water sources. India is the second largest producer of the fish with an annual production of 312.8 million tones (FAO,2008).Fish interact with the various levels of food chain and influence the structures of lakes , streams and estuaries since they are usually restricted to particular modes of life related to their food sources and reproductive requirements (Ashade et al.,2013).There are a number of helminth parasites which are transmitted to human beings only through fish(Gupta ,1959). These parasites use the fish for their shelter and food and destruct every organs resulting in pathogenic effects(Dogiel,1958). Parasites interfere with the nutrition, metabolism and secreatory function of alimentary canal, damage nervous system (Markov,1961).Parasites do not represent a monophyletic group, they are an assembly of organism belonging to separate lineages in which a parasitic mode of life has evolved independently(Zrzavy 2001;De Meeus and Renaud 2002)and organal distribution of helminth parasites in *Macrognathus aculeatus* (Khanum et al.,2011).Distribution of helminth parasites in

different size group and organs of fish (D'Silva et al.,2012).However the diversity of parasites within a single host individual is dependent on many factors ,from the season of capture to purely stochastic factors and is not often a refelction of the diversity of the pool of locally available parasite species, we will not focus on this level(Robert Poulin,2004).For instance, infracommunities of intestinal helminths in Eels, *Anguilla anguilla* become saturated with parasite species at values well below the number of parasite species locally available (Kennedy and Guegan 1996).Infracommunities of larval trematodes in gastropod hosts provide an even better illustration :individual snail almost always harbor a single trematode species ,whereas several trematode species can coexist in the same snail population(Kuris and Lafferty 1994;Esch etal.,2001). The spotted murrel,*Channa punctata*(bloch)is regarded as a delicious food fish in India (Shareef et al.,2012).

A survey of metacercarial infections in commonly edible fishand crabs host(Athokpam et al.,2015).Prevalence of helminth parasites infecting *Channa punctatus*(Kundu et al.,2015).An ecological aspects on digenetic trematode parasites of fresh water fish (Chandra et al.,2016) andPresence of digenetic trematode parasites in fresh water carnivorous fishes in Jaunpur (Singh et al.,2018).Prevalence of parasitic infections in the fresh water fishes*Channa punctatus* (Sarmin et al.,2018).It was reported that the unfavourable environmental and ecological conditions caused a variety of fish parasites (Chandra et al., 1987).Also described the relationship between digenean trematode parasites and cyprinid fish *Catla catla*(Mishra et al.,2019)and occurance of digenean trematode parasites in fresh water catfish *Wallago attu*(Singh et al.,2019). Presence of digenetic trematode parasites of cypriniformes fish *Labeo rohita*(Mishra et al.,2019).During study of different research papers and Thesis author found that a little work was done in ecological relation of *Channa striatus*and digenetic trematode parasites in District Jaunpur .In past few years no work has been done on trematode parasites in Jaunpur.Their number is also declined in recent few years .So it is important to focus on the relation of *Channa striatus* and digenetic trematode parasites in ecological terms. In this study author tried to known the relation of digenetic tremtode parasites and *Channa striatus*.

Materials and Methods:-

(a) Sample Source –Sample were collected from the different site of river Gomti (Kalichabad ghat & Hanuman ghat) and ponds (Banaba pond and Kandharpur pond) in district Jaunpur.

(b)Working time -1July 2020 to 30 June 2021.

(c)Sample collection–Fishes were collected from the given sources with the help of fishing net. Fishermen were also helped with their boats. Fishes of all size, weight and sex were collected alive from the different sites. They were collected in a plastic container and carry to the laboratory.In the laboratory samples poured in the soil jar.

(d)Sample and Digenetic Trematode parasites-*Channa striatus* , the striped snakehead ,is a species of snakehead fish .*Channa striatus* is native to fresh water habitats in South and Southeast Asia .The species can reach up to a meter in length, through because of fishing, this size is rarely found in the world .It has a widespread range covering Southern China, Pakistan ,most of India, Southern Nepal , Bangladesh ,Sri Lanka and most of Southeast Asia. It is an important food in its entire native range and is of considerable economic importance. Adults are dark brown in colour with faint black bands visible across its entire body. Eggs are guarded by both parents.It is common in fresh water plains, where it migrates from rivers and lakes into flooded fields,returning to the permanent water bodies in the dry season, where it survives by burrowing in the mud.It prey frogs, water bugs and smaller fishes(Wik.).

The digenetic trematode parasites have syncytial tegument with two suckers ,one ventral and one oral.They are mostaly occur in the digestive system but present throughout the organ system.

(e)*Standard length and weight measurement*–Samples were measured with the help of measuring board and

weighing machine was used for weight measurement. Standard protocol was followed (Paperna I.1996).

(f)*Examination, Processing of digenetic parasites for identification and statistical formula-* Author put the sample in a dissecting tray .Scissors, forceps and needle were used for opening the internal parts .They dissected darsoventrally and examined by using standard protocol.We removed internal organs like liver ,kidney air-bladder, heart and alimentary canal from the fish body .Then every organs and tissues put separately in a petri dish and washed many times with the tap water and finally filled with 0.70 % saline solution.Ascending grades of alcohol were used for the dehydration .Parasites were collected in test tube filled with 70% ethanol for 24-48 hours.After that counted one by one.Trematodes were stained in aceto-alum carmine.They were mounted in canada balsam and followed by Camera lucida diagrams,then examined under a binocular microscope. They were identified with help of Book Systema Helminthol (Yamaguti S.1954). Different formulas are used to determine the ecological terms proposed (Margolis I. et al., 1982)and given in his concluded note that a variety of terms in addition to intensity and prevalence have been used to refer either specifically or generally to the numbers of parasites occurring in a host or to the number of infected hosts in a sample.

$$\text{Prevalence \%: } \frac{\text{Total no of fish infected}}{\text{Total no. of fish host examined}} \times 100$$

$$\text{Abundance: } \frac{\text{Total no. of parasites recovered}}{\text{Total no. of fish host}}$$

$$\text{Mean Intensity : } \frac{\text{Total no of parasites recovered}}{\text{Total no. of host infected}}$$

$$\text{Index of infection : } \frac{\text{No. of host infected} \times \text{No. of parasites recovered}}{\text{Total host examined}}$$

$$\text{Dominant\% : } \frac{\text{Worm burden monthly} \times 100}{\text{Worm burden annually}}$$

Results :-

In the monthly observation we found that Prevalence was maximum in the month of July and minimum in the month of December. Abundance was maximum in the month of October and minimum in the month of December. Mean intensity was maximum in the month of October and minimum in the month of December. Dominance was maximum in the month of July and minimum in the month of December. Infestation index was maximum in the month of July and minimum in the month of December.

On the basis of seasonal aspects: Prevalence was maximum in the Rainy season and minimum in the Winter season. Abundance was maximum in the Rainy season and minimum in the Winter season. Mean intensity was maximum in the Rainy season and minimum in the Winter season. Dominance was the maximum in the Rainy season and minimum in the Winter season. Infestation index was maximum in the Rainy season and minimum in the Winter season.

Fig. 1

FAMILY-MASENIIDAE

Masenia jaunpurensis Sp. nov.

Location: Intestine

The body of trematode is extended, spinose, round and hollow fit as a fiddle with restricted front and wide back closures and measures 1.90 long and 0.59 in width. The oral suker is circular, subterminal and measures 0.13x0.14. The ventral sucker is oval, preequatorial, and somewhat littler than oral sucker, middle and measures 0.16 x 0.14. The mouth leads into a short, cylindrical prepharynx which estimates 0.03 x 0.02 long. The pharynx is solid, adjusted which estimates 0.032 x 0.034. Throat little and bifurcates at the separation of 0.33 from the front finish of body into two intestinal caeca which broadens upto the foremost degree of front testis.Excretory bladder cylindrical and excretory pore terminal Testicles postequatorial, oval or adjusted, marginally over lapping, submedian and measures 0.13 x 0.15 foremost testis and 0.14 x 0.15 back testis. Cirrus sac long, cylindrical reaching out from genital pore upto front area of hip bone socket and measures 0.53 long Basal bit is wide while distal end is restricted. Cirrus sac encases whole vesiculum seminalis. Rounded standards prostatica encompassed by prostatic organ cells. Ejaculatory conduit is long, cylindrical with little cirrus. Ovary is three-sided, pretesticular, - submedian,

preequatorial, somewhat covering the privilege ceacum and measures 0.19 x 0.15. Receptaculum seminis long, club formed lying sidelong to the overy and measures 0.16 x 0.06. Mehlis' organ cells encompass the ootype. Uterus wound, broadening upto back finish of body and rising corresponding to the cirrus sac to open at genital pore. Eggs oval operculated and measures 0.024 x 0.011 - 0.022 x 0.010. Genital pore on the dorsal side of oral sucker. Vitelline follicles enormous, stretching out from the center degree of hip bone socket upto, center degree of front testis. The new structure has a place with the sort Masenia Chatterji, of which the accompanying nine species have been depicted from Indian fresh water fishes viz. M. colcatta Chatterji, from Clarias batrachus \ M.dayali Gupta, from Clarias batrachus; M. fossilisi Gupta, from Heteropneustesfossilis; M. gomtia Agrawal, from Mystus vittatus; M. ritai Sircar and Sinha,; M. yamaguti Agrawal,; M upeneusi Gupta and Puri, and M. chauhani Maurya and Agrawal, from rita.

Fig. 2

FAMILY-MASENIIDAE

Masenia dayali Gupta, 1955

Location: Intestine

The body of Trematode is lengthened, cylindrical, and spinose with somewhat tight foremost and expansive back closures and measures. 1.60 long and 0.49 in width Oral sucker' channel formed subterminal with twofold circum oral crown of spines and measures 0.09 x 0.10. The ventral sucker is oval or roundabout, pre-central marginally submedian and measures 0.11x0.09. Prepharynx long, rounded, thin and quantifies 0.13 long. Pharynx very much created, solid, subglobular and measures 0.034 x 0.031 Esophagus long and 0.14 in lengths which bifurcate at the separation of 0.43 from foremost finish of body Caeca expands upto center degree of ovary and measure 0.32 long. Excretory vesicle saccular and excretory pore terminal. Genital pore subtermiral, marginally submedian, on the dorsal side of the oral sucker Testis two, oval or subspherical post-central, somewhat covering one another, submedian, post ovarian Posterior testis littler than front and measures 0.18 x 0.11 and 0.15 x 0.09 foremost and back separately. Cirrus sac long, rounded sickle-molded, reaching out from genital pore to pretty much front degree of hip bone socket; encasing trilobed vesicular seminalis, cylindrical standards prostatica, encompassed by prostate organ cells; restricted long, cylindrical ejaculatory conduit and cirrus. Ovary oral or three-sided pretesticular, submedian, central, marginally right side ofthe body and measures 0.06 * 0.05 Receplaculum seminis long, pear-formed lying among ovary and front testis and measures 0.122 x 0.026 Mehli's organ cells encompass the ootype. Uterus curled broadening upto back finish of body and rising corresponding to cirrus sac open at genital pore. Eggs oval, operculated and measures 0.023 x 0.010 - 0.024 x0.012 Vitelline follicles huge, sporadic, reaching out from front degree of hip bone socket upto back degree of foremost testicles.

Discussion & Conclusion:-The observation found like Prevalence was maximum in the month of July and minimum in the month of December. Abundance was maximum in the month of October and minimum in the month of December. Mean intensity was maximum in the month of October and minimum in the month of December. Dominance was maximum in the month of July and minimum in the month of December. Infestation index was maximum in the month ofJuly and minimum in the month of December which is also not satisfactory with the result of Chandra et al., (2016).It was reported that fishes have greater number and variety of helminth infection during the summer month (Dogiel et al.,1958).In further investigation it was determined that the temperature is one of the important factor controlling the trematode infection (Wang et al.,2001;Poulin and Cribb,2002).It was explained that the development of parasites need high temperature ,low rainfall and sufficient moisture(Ronde,1993 ;Jadhav and Bhure,2006). Some fishes have greater incidence and intensity of the helminth infection other than summer season (Pal,1963;Burrough ,1978).Climatic factors affect parasites directly and the temperature amongst them in the most important single extrinsic factor which influence the parasites(Noble and Noble,1976).The seasonal cyclicity of digenetic trematode infection in fresh water fishes is temperature dependent (Pennuyuick,1971a,b;Cannon,1972). On seasonal aspects: Prevalence was maximum in the Rainy season and minimum in the Winterseason. Abundance was maximum in the Rainy season and minimum in the Winter season. Mean intensity was maximum in the Rainy season and minimum in the Winter season. Dominance was the maximum in the Rainy season and minimum in the Winter season. Infestation index was

maximum in the Rainy season and minimum in the Winter season not similar to the result of Chandra et al., (2016).

Factors influencing the seasonal variation of trematodes are feeding habits (Pennuyuick, 1971a,b) and reproductive status of the host (Evans,1977a),oxygen tention ,host species, behaviour, migration ,immunity and interaction of both biotic and abiotic factors (Chubb,1977).There is meagre positive correlation between the host size and total parasitic infection and impact of diet and feeding habits on the parasitic infection in the fish hosts were carried out by (Lugue et al.,1996 and Johnson et al.,2004).The variation in the infection with age group may be as younger fish have less capacity of feeding whereas older fish may be resistant and therefore do not allow new extra parasite burdens(LO et al.,1998;Johson et al.,2004).The temperature dependent infestation of adult digenean has been reported in *Bunodera luciopercae*(Wotten,1973a and Andrews,1977).The water temperature may be the most significant factor for understanding the seasonal dynamics of metacercaria in the fishes of mid latitude climatic zone of the world (Chubb,1979).It has reported that the incidence of infection of *Sterrharus monolecithus* and *Fastula bravichrus* remain higher in winter months with maximum in the month of september in the host fish *Hilsa ilisha* and this may due to migratory habits of fishes influencing directly the parasitic fauna of the host (Srivastava,1935; Pal,1963).

On the above findings the author knew the load of digenetic trematode parasites in *Channa striatus*. Author found that different ecological aspects shows fluctuation monthly as well as seasonally. Maximum infestation index occur in the rainy season and minimum in winter season. Diseases have an effect on the food value and market value of fish.So it is important to use different preventive measures to check the infection and also aware people about the infection. In figure one the current structure varies from all the realized species in having vitellaria follicles from the locale between intestinal bifurcation and acetabulam. The proportion of oral and ventral sucker (1:1). Prepharynx enormous. Intestinal caeca broadens upto front degree of foremost testis and receptaculum seminalis pear-formed, postero-sidelong to ovary. It further contrast M. collata and M gomtia in having ovary bigger than testis, caeca upto foremost testis while it shows similarity to the M. collata and M. chauhani in having snaked cirrus sac.The name of new species, Masenia jaunpurensis is given on locale Jaunpur.In figure two the current structure has a place with Masenia dayali Gupta, 1955 from Clarias batrachus at Saharanpur and is accounted for first time from Jaunpur with another host, Channa punctatus. It contrasts from unique depiction in having bigger throat, extention of caeca upto front degree of foremost testis and vitteline follicles from foremost degree of ventral sucker upto back degree of foremost testis.

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Tables, Graph & Figure :- Following graph& figure were found with the help of data

MONTH	NO OF HOST EXAMINED	NO OF HOST INFECTED	NO OF PARASITES	PREVALENCE %	ABUNDANCE %	MEAN INTENSITY	DOMINANCE
JAN	05	01	01	20.00	20.00	1.00	0.01
FEB	08	02	03	25.00	37.50	1.50	0.03
MAR	07	01	02	14.28	28.57	2.00	0.02
APR	08	03	04	37.50	50.00	1.33	0.05
MAY	14	06	10	42.85	71.42	1.66	0.12
JUN	12	06	09	50.00	75.00	1.50	0.11
JUL	15	11	17	73.33	113.33	1.54	0.22
AUG	10	05	12	50.00	120.0	2.40	0.15
SEP	06	02	04	33.33	66.66	2.00	0.05
OCT	11	02	15	18.18	136.36	2.50	0.06
NOV	14	04	09	28.57	64.28	2.25	0.11
DEC	13	01	01	07.69	7.690	1.00	0.01

Ecological terms and *Channa striatus* (Monthly)
Table no. 1

SEASONS	NO OF HOST EXAMINED	NO OF HOST INFECTED	NO OF PARASITES	PREVALENCE %	ABUNDANCE %	MEAN INTENSITY	DOMINANCE
SUMMER	41	16	25	39.02	60.97	1.56	0.32
RAINY	42	20	38	47.61	90.47	1.90	0.36
WINTER	40	08	14	20.00	35.00	1.75	0.18

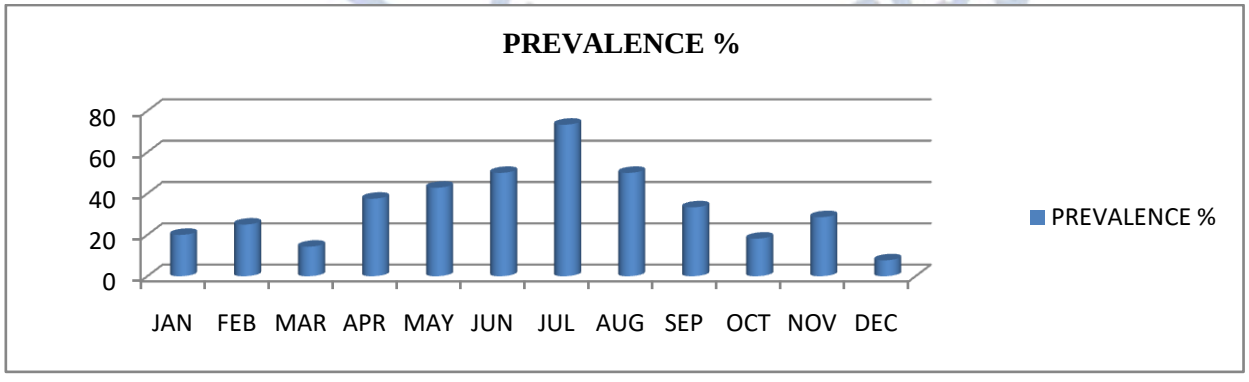
Ecological terms and *Channa striatus* (Seasonal)
Table no. 2

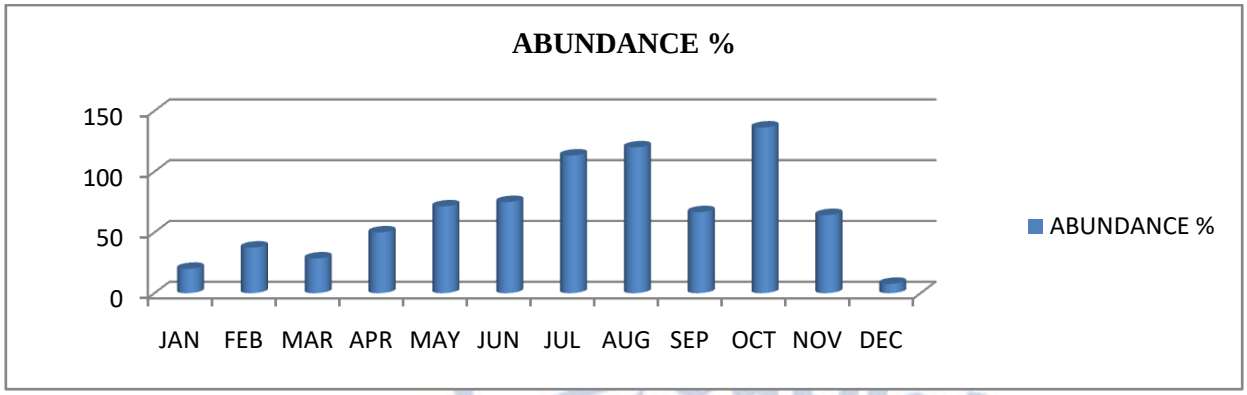
MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
I.I.	0.20	0.75	0.28	1.50	4.28	4.50	12.46	6.00	1.33	0.90	2.57	0.07

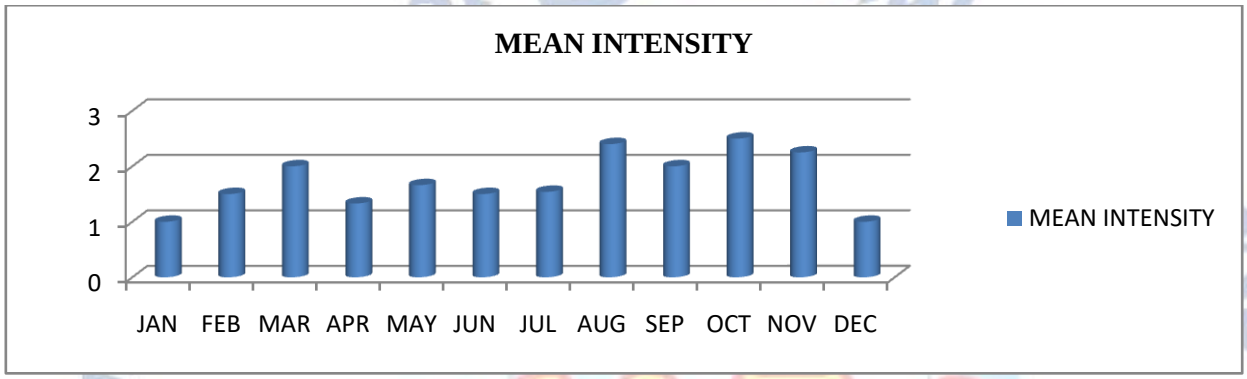
Ecological terms and *Channa striatus* (Monthly)
Table no. 3

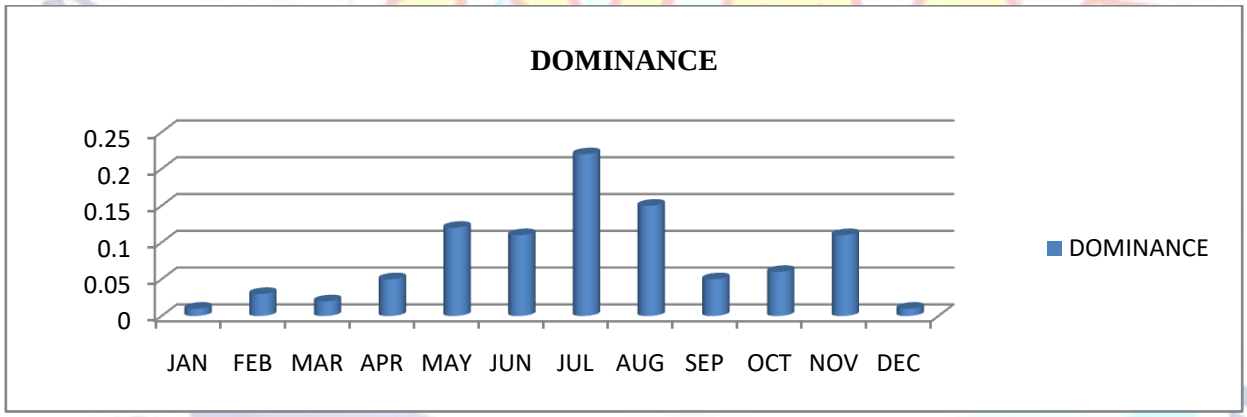
SEASONS	SUMMER	RAINY	WINTER
I.I.	9.75	18.09	2.80

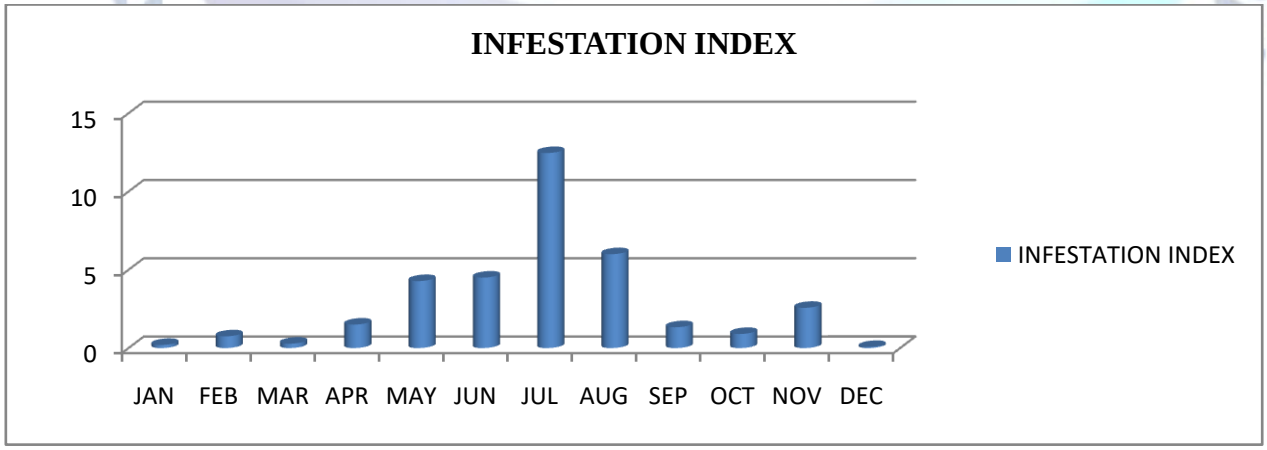
Ecological terms and *Channa striata* (Seasonal)
Table no. 4



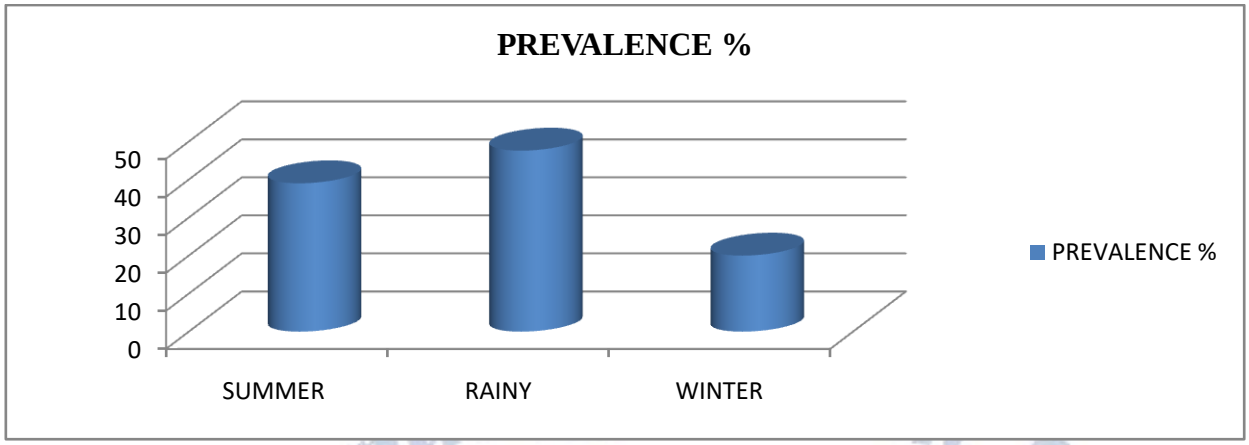


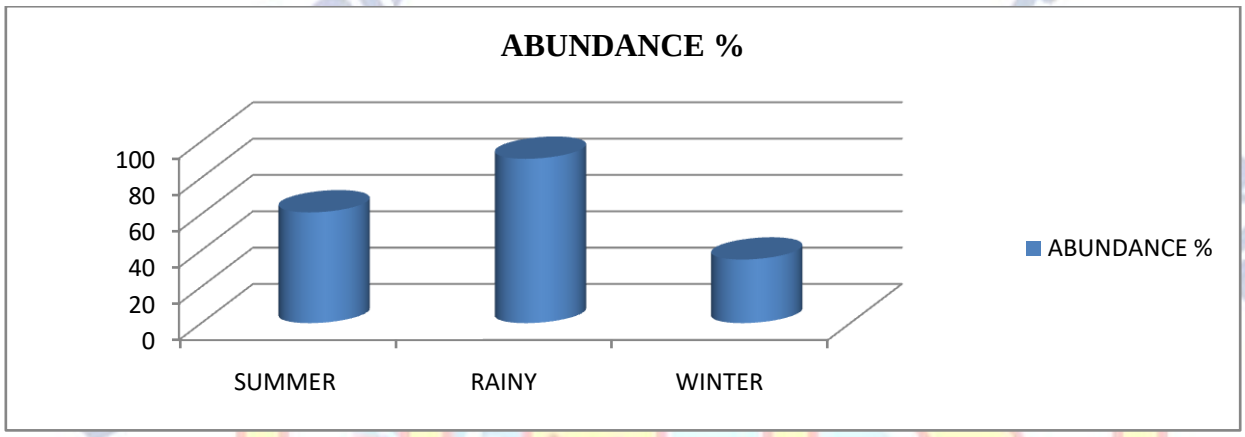


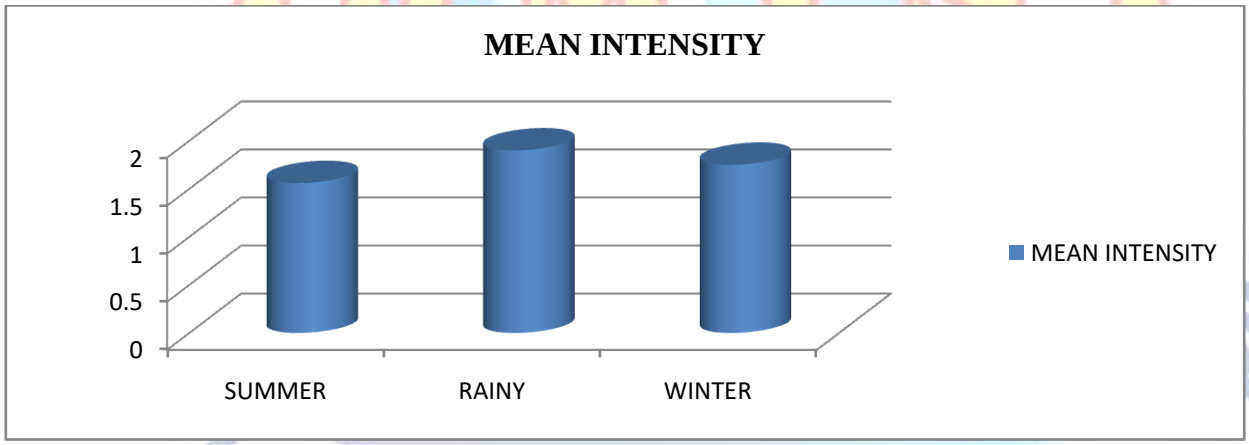


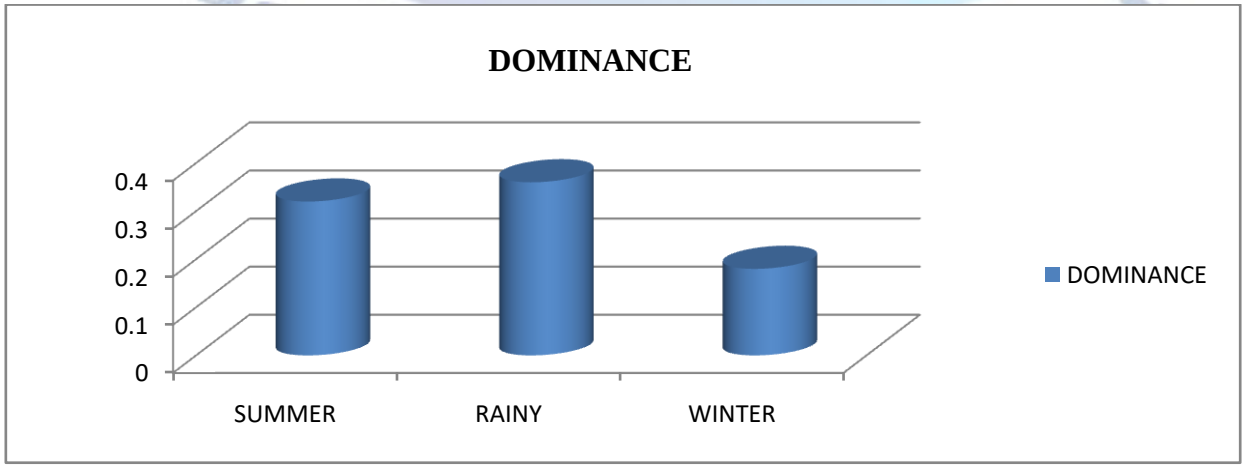


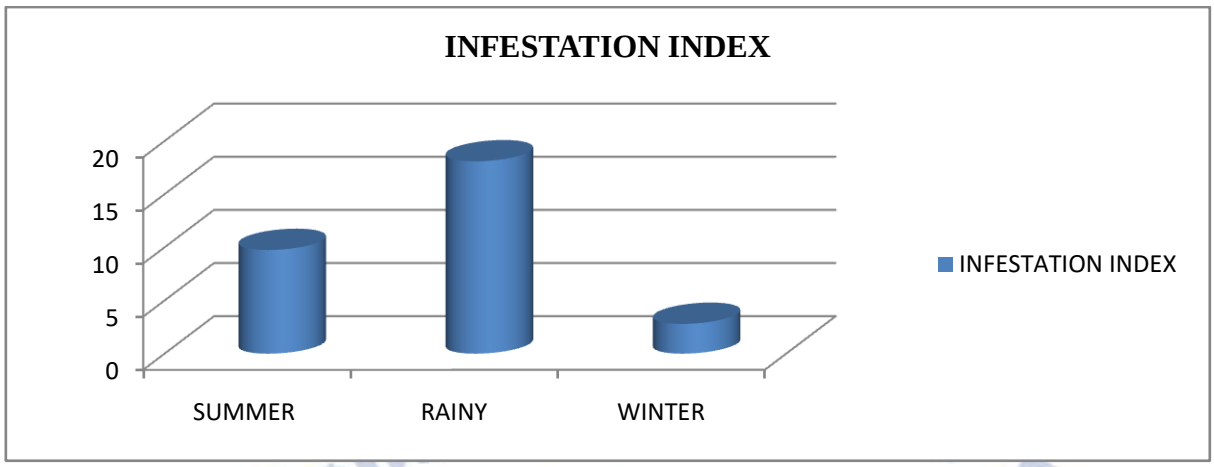
Graph, (Monthly)


PREVALENCE %
50
40
30
20
10
0
SUMMER
RAINY
WINTER
PREVALENCE %


ABUNDANCE %
100
80
60
40
20
0
SUMMER
RAINY
WINTER
ABUNDANCE %


MEAN INTENSITY
2
1.5
1
0.5
0
SUMMER
RAINY
WINTER
MEAN INTENSITY


DOMINANCE
0.4
0.3
0.2
0.1
0
SUMMER
RAINY
WINTER
DOMINANCE



Graph,(Seasonal)

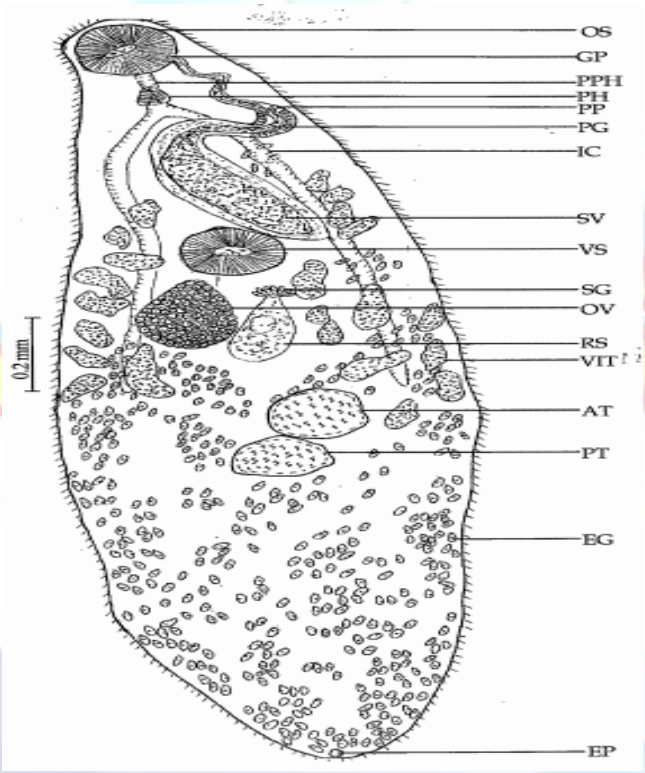


Fig 1: Maseniajaunpurensis Sp. nov.

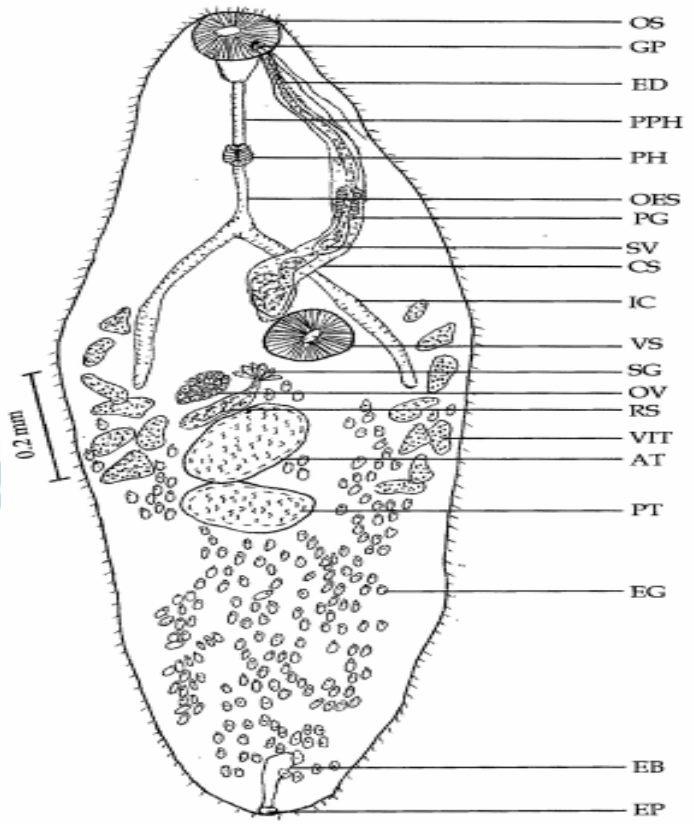


Fig 2: Masenia dayali Gupta, 1955