

# MONOGENETIC TREMATODE INFESTATIONS IN INDIAN MAJOR CARPS OF AYODHYA DIVISION ( U.P.), INDIA

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## ABSTRACT

A Study was conducted to investigate the infestations of monogenetic trematodes of juvenile carps of district Sultanpur (U.P.). A total of six (06) farms 03 Government (Govt.) and 03 Private (Pvt.) were investigated for Indian major carps - Rohu (*Labeo rohita*) Bhakur (*Catla catla*), and Mrigal (*Cirrhinus mrigala*) during February 2019 to January 2020. Monthly sampling were carried out with 10 fishes of each species and each farm. Altogether **2160** fish host were examined of which **997** hosts were found to be infested with monogenetic trematodes. The monogeneans were very common in gills of all fishes. Water quality parameters were taken and management practices were also noted. The risk of infestation of carps by monogeneans increased when the water quality parameters were deteriorated. Prevalence (%), mean intensity and abundance were found to be species specific and also varied with seasons and management systems practiced by different farmers. The prevalence % of monogeneans were higher in rainy season than dry season. Rohu was more infected by monogeneans in comparison to Bhakur and Mrigal.

Key Words : Monogenetic Trematode, Infestation, Indian Major Carps.

## 1. INTRODUCTION :

Monogenetic trematodes are mainly ectoparasites of fishes, occasionally they are found endoparasitic (Gusser and Fernando, 1973 reported *Enterogyrus globodiscus* and *Enterogyrus papernal* from *Etroplus suratensis* at ceylone). Among parasites infecting fishes, the monogeneans constitute a group, which plays an important role as pathogens of severe diseases. This is because they affect those organs and tissues, which are vital to the normal functioning such as gills and skin, the organs of respiration. The monogeneans affecting internal organs are presently insufficiently

known and the role of such species in the pathological process has not been adequately studied (Bauer, 1977).

Monogeneans are small to medium sized trematodes which complete the life cycle on one host. In majority of cases, monogeneans cause dual mode of injury to their hosts. Through their hooks and other organs of attachment, they break the continuity at the site of attachment and result in the localised hemorrhages. The chief organ of attachment is the haptor, which is posterior, mostly parasitic on gills, some on the body and fins. Some monogenetic trematodes are serious pests in fish culture on occasion. In hatcheries and culture ponds, some dactylogyrids cause great damage to gill filaments and some caused damage on skin and fins of carps (**Hoffman**, 1967). They usually infect gills, skin and fins and cause damage of host tissue by their haptor, anchors and hooks during feeding. Three species of Indian major carps, Rahu (*Labeo rohita*), Bhakur (*Catla catla*) and Mrigal (*Cirrhinus mrigala*) are the principal fishes cultured throughout India particularly in eastern Uttar Pradesh. Several exotic fishes are also cultured along with our indigenous species in composite fish culture or polyculture system for higher production (**Das**, 2003). Mortalities of these species accompanied by Dactylogyrus and Gyrodactylus infestations of the gills and skin has caused serious concern among fish farmers now a days. These are cosmopolitan parasites occurring highly in larval and in adult stages, produce a wide variety of effects on fishes (**Chandra et. al.**, 1996).

Prevalence of fish disease has negative economic impact on fish culture. Studies of fish diseases in India especially in eastern Uttar Pradesh are limited to diagnosis, characterization and control of pathogens involved. Some studies have been undertaken only on socioeconomic aspects of developing pond fish culture (**Rahaman and Miah**, 2001 ; **Arthur and Ahmad**, 2002). These studies did not assess the loss of fish due to disease in grow out ponds and thus do not reflect the overall economic impact in fish production. There is a need to understand not only the prevalence of various diseases and pathogens but also the need to understand the economic losses resulting from disease outbreak. Production-loss assessment, assessment of economic impact of disease on production and optional investment for fish disease control are essential. Field survey is the most practical way in collecting such information directly from a large number of farmers.

The present work, on monogeneans infestation on fish culture is one of the significant and priority areas. The above background keeping in mind, the present research programme is considered to be undertaken with the study of seasonal infestations of monogeneans in different carp species, general pattern of infestation of monogeneans in different seasons and infestations of

monogeneans in different farming systems of juvenile indigenous farmed carps of district sultanpur (U.P.).

## 2. MATERIAL AND METHODS

For the investigation of monogeneans six fish farms, 3 Government farm (Peperpur fish seed farm piperpur Amethi, Kamla Nehru fish seed farm Sultanpur and Saryu fish seed farm Masaudha, Ayodhya) and 3 Private farms (Maharani Ka Talab Bhati khurd, Sultanpur, Sagara fish pond Amethi and Vikas Singh fish farm Ayodhya) were selected. To observe the seasonal variation three distinct seasons were used as summer season (February-May), rainy season (June-September) and winter season (October-January) in the experimental period. Rohu, Bhakur and Mrigal were selected as the experimental fish and sampled regularly from all sampling stations. Experimental fishes were collected for a period of 12 month from February 2019 to January 2020. Samples were collected from each farm government as well as private at monthly intervals. 10 samples of each species were collected from each sampling station with the help of seine net. Fish samples were transported to the laboratory of post graduate Department of Zoology Ganpat Sahai P.G. College Sultanpur with plastic containers and bags. The young carps or juvenile were examined quickly for monogeneans infestation, injury, infection and other abnormal conditions of fish body. Fishes were killed by a blow on the head. Then cut both the opercula of fish remove gills. The dissected gills were placed in petridish containing clean water. Prior to gill removing external examination were made by scrapping the skin and examining smear using a magnifying glass or by under microscope.

### 2.1 Collection of Parasites:

The monogeneans were collected from gill region by using Mizelle's (1936 & 38) freezing techniques. The dissected gill were kept in refrigeration for 8-48 hours. The low temperature not only relaxes the parasites but also help in automatic removal of mucous in which these flukes were entangled. Subsequently the gills were removed, placed in separate tubes, half filled with water and sake vigorously. This solution now poured in clean petridishes, diluted with water and examined under binocular microscope. The live monogeneans were gently rubbed to dislodge from the gill filaments with the help of a triangular pointed needle and forceps as suggested by **Malmberg** (1957). The monogeneans were removed and picked out using a fine pipette with a small drop of water on a clean slide and covered with a cover slip.

### 2.2 Fixation and Preservation :

Monogeneans were fixed with a drop of ammonium picrate or Malmberg fixative introduced beneath the cover slip to fix and clean the parasite. Sometimes monogeneans were immediately fixed in 70% ethyl alcohol or 10% neutral formaline for further processing. Preserved monogeneans were studied under microscope and their size shape and chitinoid structure was noted. Then the slides were marked by a marker pen according to probable monogenetic trematode.

### 2.3 Identification :

Identification and classification of the parasites were done following **Woo** (1999) and **Chandra** (2008). The ecological terms for prevalence (%), mean intensity of infestation and abundance were used after **Margolis et. al.** (1982) as

$$\text{Prevalence} = \frac{\text{No. of hosts infected}}{\text{No. of hosts examined}} \times 100$$

$$\text{Mean intensity} = \frac{\text{No. of Parasites observed}}{\text{No. of infected fish}}$$

$$\text{Abundance} = \frac{\text{No. of Parasites observed}}{\text{No. of host examined}}$$

### 3. OBSERVATION :

#### **Seasonal changes in infestations of monogenean parasites in different carp host**

The prevalence of monogenean parasites were found fluctuated in irregular pattern over the study period. The highest prevalence observed in rainy season in both government and private farms. The highest prevalence found in rainy season in Rohu (*Labeo rohita*) and the lowest is found in summer season in Bhakur (*Catla catla*) at government farms. In case of private farms, the highest mean intensity and abundance were determined as **6.50** and **3.90** respectively for Rohu in rainy season, but they were recorded as **6.41** and **3.46** in government farms. Similar infestation was observed in other fish too.

**Table 1. Seasonal infestations of monogenean parasites for one year data recorded in different carp species from six sampling stations during February 2019 to January 2020.**

Seasons	Fish Species	No. of host fishes		Total load of monogeneans	Prevalence (%)	Mean intensity	Abundance
		Examined	Infested				
<b>GOVERNMENT</b>							
Summer	Rohu	120	57	356	47.50	6.25	2.97
	Bhakur	120	34	147	28.33	4.32	1.23
	Mrigal	120	45	232	37.50	5.16	1.93
Rainy	Rohu	120	66	416	55.00	6.30	3.46
	Bhakur	120	49	262	40.83	5.34	2.18
	Mrigal	120	62	342	51.67	5.51	2.85
Winter	Rohu	120	61	391	50.83	6.41	3.26
	Bhakur	120	43	197	35.83	4.58	1.64
	Mrigal	120	52	292	43.33	5.62	2.43
<b>Total</b>		<b>1080</b>	<b>469</b>	<b>2635</b>	<b>43.43</b>	<b>5.62</b>	<b>2.44</b>
<b>PRIVATE</b>							
<b>Summer</b>	<b>Rohu</b>	120	61	392	50.83	6.42	3.27
	<b>Bhakur</b>	120	43	217	35.83	5.04	1.81
	<b>Mrigal</b>	120	49	276	40.83	5.63	2.30
<b>Rainy</b>	<b>Rohu</b>	120	72	468	60.00	6.50	3.90
	<b>Bhakur</b>	120	58	282	48.33	4.86	2.35
	<b>Mrigal</b>	120	65	378	54.16	5.82	3.15
<b>Winter</b>	<b>Rohu</b>	120	68	422	56.67	6.21	3.52
	<b>Bhakur</b>	120	53	253	44.17	4.77	2.11
	<b>Mrigal</b>	120	59	328	49.17	5.56	2.73
<b>Total</b>		<b>1080</b>	<b>528</b>	<b>3016</b>	<b>48.89</b>	<b>5.71</b>	<b>2.79</b>

### Seasonal Changes in infestations of monogenean parasites in carp host

In case of seasonal variation of infestations monogenean parasites in carp fishes showed that in private fish farm the highest prevalence (54.17%) has been recorded in rainy season followed by 50.00% and 42.50% for winter and summer season respectively in private fish farm. In case of government fish farm, the highest prevalence (49.17%) has also been observed in rainy season

followed by 43.33% and 37.78% for winter and summer season respectively. The mean intensity and abundance of this parasitic disease were attained as the highest in rainy season among the government and private fish farms (Table 2).

**Table 2. Seasonal Variation of infestations of monogenean parasites of one year data of carp fishes during Feb 2019 to Jan 2020.**

Farm Category	Seasons	No. of host Examined	fishes Infested	Total load of monogeneans	Prevalence (%)	Mean intensity	Abundance
<b>Govt.</b>	Summer	360	136	735	37.78	5.40	2.04
	Rainy	360	177	1020	49.17	5.76	2.83
	Winter	360	156	880	43.33	5.64	2.44
<b>Total</b>		<b>1080</b>	<b>469</b>	<b>2635</b>	<b>43.43</b>	<b>5.62</b>	<b>2.44</b>
<b>Pvt.</b>	Summer	360	153	885	42.50	5.78	2.46
	Rainy	360	195	1128	54.17	5.79	3.13
	Winter	360	180	1003	50.00	5.57	2.79
<b>Total</b>		<b>1080</b>	<b>528</b>	<b>3016</b>	<b>48.89</b>	<b>5.71</b>	<b>2.79</b>
<b>Combined</b>	Summer	720	289	1620	40.13	5.60	2.25
	Rainy	720	372	2140	51.67	5.75	2.97
	Winter	720	336	1883	46.67	5.60	2.62
<b>Total</b>		<b>2160</b>	<b>997</b>	<b>5643</b>	<b>46.16</b>	<b>5.66</b>	<b>2.61</b>

### Changes in infestations of monogenean parasites in carps of different fish farms

Among the different Govt. and Pvt. fish farms the highest prevalence found in Sagara fish farm Amethi (Pvt. fish farm), mean intensity and abundance were found in Maharani Ka Talab, Bhati Khurd, Sultanpur (Pvt. fish farm) and minimum prevalence, mean intensity and abundance were found in Peepirpur fish seed farm Amethi (Govt. fish farm). The prevalence, mean intensity and abundance were found minimum in Govt. fish farm (Table 3). The prevalence of infestation in Pvt. fish farm (48.89%), higher than that of Govt. fish farm (43.42%) where as the highest mean intensity and abundance were 5.71 and 2.79 respectively observed in Pvt. fish farm.

**Table 3. Infestation of monogenean parasites in one year data of carp fishes of different fish farms during Feb. 2019 to Jan. 2020.**

Type	Name of the fish farm	No. of host fishes		Total load of Monogenea	Prevalence	Mean intensity	Abundance
		Examined	Infested				
Govt.	Piperpur FSF Amethi	360	152	852	42.22	5.61	2.37
Govt.	KNKVK FSF SLN	360	160	902	44.44	5.64	2.51
Govt.	Saryu Ayodhya	360	157	881	43.61	5.61	2.45
	<b>Total</b>	<b>1080</b>	<b>469</b>	<b>2635</b>	<b>43.42</b>	<b>5.62</b>	<b>2.44</b>
Pvt.	Maharani Ka Talab	360	161	1042	44.72	6.47	2.89
Pvt.	Sagara fish Pond	360	190	1024	52.78	5.28	2.84
Pvt.	Vikas Singh fish farm	360	177	950	49.17	5.37	2.64
	<b>Total</b>	<b>1080</b>	<b>528</b>	<b>3016</b>	<b>48.89</b>	<b>5.71</b>	<b>2.79</b>

#### 4. DISCUSSION :

Monogenean infestations are very common in carps in Indian fish farms (Gussev, 1976; Tripathi, 1957). During the investigation prevalence to this fluke in Indian major carps was quite high and fishes of larger size group were more susceptible. However, several authors have noted only the correlation between outbreak of monogenean infestations and stocking densities (Johnsen and Jensen, 1986). It was also observed in our study that monogenetic infestations were higher in case of fishes collected from Pvt. fish farm as they culture with more density.

The prevalence of monogenetic trematodes in carp fishes was higher in Pvt. fish farm than Govt. fish farm. The prevalence of this parasitic disease was higher in rainy season than winter and summer. Rohu (*Labeo rohita*) was more infected by this parasite than Bhakur (*Catla calta*) and Mrigal (*Cirrhinus mrigals*). The food of monogenean parasites is host's mucous, epithelium and sometimes blood. It causes mortality in hatcheries, nurseries and culture ponds, thus resulting in great economic losses (Tripathi, 1957).

Rainy and winter season were the most susceptible period of the year when fish parasites are abundant. This could be due to stocking density, water depth, temperature along with other physico-chemical parameters and management practices maintained. Mohan and Bhatta (2002) reported that monogeneans are some of the very important pathogens that have had significant impact on the yield in carp hatcheries and seed production centres.

In the present study, Pvt. fish farms were found to be more affected with monogenean parasites as compared to Govt. fish farm. Among Pvt. fish farm, sagara fish farm Amethi was more infected and Maharani Ka Tablab fish farm Bhati Khurd, Sultanpur was less infected. In case of Govt. fish farms Kamla Nehru KVK Sultanpur fish seed farm was more infected and Piperpur Govt. fish seed farm was less infected by monogenean parasites. The causes of higher/lower infestation in prevalence, mean intensity and abundance were different due to different nature of management practices like pond preparation, depth of water, turbidity, stocking density, feeding of fry/fingerlings etc.

During the period of investigation, infestation was changed with seasonal variation. The monogenean infection was highest in rainy season and lowest in summer season. This result agrees with (Das, 2003, Benerjee and Bandyopadhyay, 2010). Barai and Chandra (2005) reported that the highest monogeneans infection in fry and fingerlings of carps were in August and September (rainy season) because of the highest stocking density. Hossain (2007), Das, Majumder and Chandra (2016) mentioned that increased occurrence of disease in the rainy season might be due to unfavorable environmental condition.

## 5. CONCLUSION :

The present study highlighted the infestation and disease problems, including their identity. Monogeneans were found mainly in gills. Infestation begins at the early stage of fish life, highest infestation of monogeneans was found in Rahu (*Labeo rohita*). Monogenean infestation was a common problem of fish farmers in Ayodhya division of Uttar Pradesh. The total fish production in this division could be increased by controlling the monogenean infestation and diseases.

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