

**ECTO-PARASITES OF SOME COMMERCIALY IMPORTANT  
FISHES FROM FISHERIES DEVELOPMENT CENTER, LAHAN,  
SIRAHA, NEPAL**



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**INSTITUTE OF SCIENCE AND TECHNOLOGY**

**TRIBHUVAN UNIVERSITY**

**KIRTIPUR, KATHMANDU,**

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## DECLARATION

I hereby declare that the work presented in this thesis has been done by myself, and has not been submitted elsewhere for the award of any degree. All sources of information have been specifically acknowledged by reference to the authors or institution.

**Date: 1/12/2079**

A handwritten signature in black ink, appearing to read 'Braham Dev Paswan', written in a cursive style with a horizontal line underneath.

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**RECOMMENDATION**

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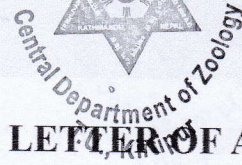
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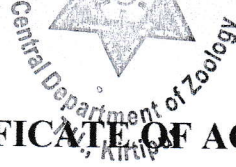
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**CERTIFICATE OF ACCEPTANCE**

This thesis work entitled "Ecto-parasites of some commercially important fishes from Fisheries Development Center, Lahan, Siraha, Nepal" submitted by Mr. Braham Dev Paswan has been accepted as partial fulfillment for the requirements of Master's Degree of Science in Zoology with special paper Ecology.

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## **LIST OF ABBREVIATIONS**

FDC	Fishery Development Center
MA	Mean intensity and Abundance
FAO	Food and Agriculture Organization
UNDP	United Nations Development Programme

## ABSTRACT

Fish sample were collected from Fisheries Development Center, Lahan, Siraha during the months Nov. to Jan. The field was visited every after 15 days. The sample was brought to Central, Department of Zoology, Kirtipur for laboratory work. Total 60 alive sample were collected in mouthed bottle filled with 30% alcohol. The fish sample collected were divided in to three group small (<10cm), medium (10-15cm) and in larger length group (>15cm) with 15 fishes in each. All together 249 parasites were collected from infected fish. The number of infected samples was 28 out of 60. During the study protozoan parasites were not found. Two parasites were Crustaceans, *Argulus* spp. and *Lernaea* spp. one Monogean parasites *Dactylogyru* sp. these parasites were collected from scales, gills, skin and mucus of fish. The quantitative and qualitative data was analyzed statically by using statistical parameters like mean intensity and abundance of fish parasites. The highest mean intensity was 14.52% and highest abundance 7.15% found in larger length group of fish. In winter season the temperature was very low hence it will create favourable environmental condition for parasitic diversity of host. The statistical quantitative and qualitative value of fish parasites was measured using excel.

# 1. INTRODUCTION

## 1.1 Background

Nowadays the aquaculture sector is rapidly developing. According to a report of economic survey the production and export is increasing in aquaculture. (Shakeel, et al. 2023) The widespread use of pesticides, antibiotics and vaccines to eradicate pests and disease vector lead to resistance in major agriculture and aquaculture system. Due to anthropogenic impact may cause rise in temperature it may produce greenhouse gases. Warming may change due to melting of glacier, warming of air masses and increased evaporation. This warming may indirectly affect aquatic ecosystem. Hence, increase in temperature it may affect physiology of fish and metabolism may reduce the growth, motor function, behavior and reproduction of fish.

A parasite is considered to be lower organism which may associated with another organism. The host, species may metabolically, directly or indirectly dependent. Parasite are mainly two types some are free living and some are parasitic, free living organisms are zero dependence whereas parasitic organism is 100% dependence. (Smyth, et al. 1994) Crustaceans parasites are commonly found aquatic ecosystem. Crustaceans parasites are adapted to high temperature, salinity, pressure and it may also adapt to low oxygen. Parasitic animal may affect growth rate and reproductive performance of host. The crustacean parasite may damage gills, killing of host and stunting of fish. It may a cause economic loss, morbidity and mortality in fish. Fish pathogens are Virus, Protozoa, Bacteria, and Nematodes (Davies 1982; Ravichandran et al. 2001; Ravichandran and Kumar, 2007). The color of gills is changed to pale. It may indicate anaemia due to loss of blood from fish (Romestand et al. 1977, Romestand 1979). *Argulus* are large parasite it may attached to gills of fish and it is easily seen in necked eye.

*Dactylogyrus* spp. is a monogenean parasite. Hooks are present in *Dactylogyrus* spp. that may attach to the gills of fish which may cause disease in gill (Molnar, 1971, Yangetal., 2016). *Trichodina* is an ecto-parasite. It is widely distributed. About 400 *Trichodinids* have been identified worldwide, mostly they are ecto-prarasite, some are symbionts to fishes and other amphibians (Xu and Song 2008; Hu 1012: Qui et

al.2011: Mitra et al, 2013: Wang et al. 2017 a). *Trichodina* is a parasitic species they are found in both marine and fresh water where adhesive disc present on their mouth (Van As and Basson 1989). *Trichodina* species may damage gill epithelial cell of fish. *Trchodina* parasite may cause asphyxia and finally death to infected host (Tang and Zhao 2007: Valladao et al. 2013).

Fishes are aquatic animal they live in water, their body is streamlined and different types of nutrients rich in fish (Kumar et a., 2020, Verma and Prakash, 2020, Syed et al., 2020). Fish parasites are widely diverse in carnivorous fishes compared to herbivorous fishes. (Zaman and Leong, 1987: Wierzbicka, 1991: Kennedy, 2009: Beevi and Radhakrishna, 2012: Gudivada, and Vankara, 2017: Vankara, 2018b). Fish is the major source of protein about 60% of cholesterol level reduced in human consumption. Different types of fish parasite may cause problem in culture or wild fish population. Due to parasitic infection it may cause economic loss for farmer. Parasite may infect to human when people take of poorly cooked, raw and processed fish. Zoonotic disease may be caused in developing countries where they are dependent on fish as 30% of protein. Fish parasite infested to fish then the growth of fish badly affected, it may change the behavior, reduced the ability to swim, and decrease the growth rate of fish.

### **1.1.1 Diseases caused by parasites and pathogens**

**Protozoa:** The common parasite which may cause protozoan disease these are *Costia*, *Ichthyophthirius*, *Myxobolus* and *Trypanosoma*. *Coastia* is common disease in fish farm. The symptoms of this disease are slimy secretion on skin, fin and gills. Affected surface look like a light grey fog. Red patches also appear on the affected parts. If fishes are affected with parasite, then small fish will die within a few days and large fish will take longer time to die. *Ichthyophthirius multifilis* parasite multiply very fast it may cause white spot and itch disease. When fishes are weak then high chance of attacking parasite and epidemics break out. In the gills, *Trypanosoma* cause sleeping sickness by infecting blood in a number of fishes.

**Worm disease:** All together 4 groups of fish worm flatworm (trematodes) tapeworm (cestodes), roundworm (nematodes) and thread headed worm. These parasites may affect internal organ. *Distomum* and *Dactylogyrus* is flatworm. These parasites may attack gills of fish. It may cause swelling of gills. Tapeworm is more dangerous than

flatworm infection and tapeworm is more common in wild fish as compared to culture fish. *Linguae intestinalis*, infected fish showed symptoms like swelling the belly and it may cause infertility.

### **1.1.2 Short description about commercial fishes.**

#### **Naini (*Cirrhinus mrigala*):**

*Cirrhinus mrigala*. body is streamlined, the abdomen is rounded with deeply forked caudal fin. Their snout is depressed, mouth is broad, and obtusely round and the upper lip is entire. Barbels are two in number. The colour of their eye is golden. The average length of this fish is about 40cm. It is found in river and lake of northern India. It breeds during monsoon months. It is most suited for induced breeding and now available throughout India.

#### **Common carp (*Cyprinus carpio*)**

It is important cultured fish. Their body is covered with large unevenly bright yellow scales. Due to unevenly arrangement of scales a large area of the body remains scale less. Scales are mostly restricted to lateral line.

#### **Grass carp (*Ctenopharyngodon idella*)**

Its growth is fine and it is tasty fish and liked by many people. Their body is oblong and head is small and pointed. Uprturned mouth is found breeding is similar to carp.

#### **Silver carp (*Hypophthalmichthys molitrix*)**

It is the fastest growing carp amongst indigenous and exotic fishes. Its head is small and pointed, the lower lip is protruded but the upper lip is slightly bifurcated. The length of jaw is equal to lower one and upper jaw is slightly notched. The dorsal fin is behind of ventral fin. It is non predatory fish like phytoplankton and zooplankton. It is the fastest growing exotic carp. It feed on protozoan and rotifers. It controls the algal bloom. It is surface feeder fish.

## **1.2 Objectives**

### **1.2.1 General Objective**

The general objective is to identify ecto – parasites of some commercially important fishes from fisheries development center Lahan, Nepal.

### **1.2.2 Specific Objectives**

- To identify major parasites which is found in commercial fishes Naini, Common carp, Grass carp and Silver carp.
- To investigate abundance and mean intensity of ecto- parasites.

## **1.3 Significance**

Farmers of Siraha district are specially buying the fries and fingerling from this farm. and Common carp are the most economically important fisheries it occupies more area in the fish farm. Fish parasites are mostly protozoa, crustaceans and helminths which cause the body infestation and are responsible for disease in fish. These parasites may infect all commercial fishes in Nepal. From Fishery Development Center, Lahan, Siraha, Nepal identification, mean intensity, and abundance of fish parasite is not been explored. This study will help to determines the sites of parasitic infection along with intensity and abundances of fish parasite. which in turn will be helpful in treatment of pond and fish.

## 2. LITERATURE REVIEW

### 2.1 Fish Parasites

Okunade et al. (2023) state that crustacean's parasite infecting the cultured fish species. About 484 fish sample of *Clarias gariepinus* were randomly collected from fish farm of three agro-ecological zone of Lagos state of Nigeria. *Argulus* are only crustacean parasite its prevalence and intensity of infection is about 1.05% and 2 found in gills of fingerlings fish during rainy season. The prevalence record of *Argulus* was found to be low due to good management practices despite the expected influence of optimum temperature and low dissolved oxygen in favour of the parasites.

Silva et al. (2023), reported that the fish ecto-parasitic diversity, gill alteration in *Hoplerythrinus unitaeniatus* (Characiformes: Erythrinidae) and *Cichlasoma bimaculatum* (Perciformes: Cichlidae) and quality of fishing water in the Quilombola zone in Maranhao State, Brazil. Fish ecto-parasites were identified from fish specimen from the animal mucus, body surface and gills. About 30.95% prevalence comprised three phyla Platyhelminthes, Trematoda and Anthropoda. were identified as ecto-parasite. The histological calculated index has shown about 23.80% of specimens with moderate tissue damage (organ function was not compromised), 4.77% presented moderate to severe tissue change (normal functioning of organs was impaired) and 9.52% very severe and irreversible lesions.

Peddinti et al., (2021) reported that all together 18 fresh water fish species which belong to 10 families from Andhra Pradesh of River Penna were examined for metazoan ecto-parasite of which only 12 fish species were infected by at least one parasitic species. The prevalence record of 12 infected fish was found to be 98.9% (*Wallogo attu*) to 30% (*Salmostoma bacaila*) its mean intensity 44.3 (*Oreochromis niloticus*) to 0.1 (*Glossogobius giurus*). The dominance pattern was found to be Monogena> Copepoda> Isopod. The most heterogeneous parasite found was found in *W.attu*. It also said that lesser scales on the body of carnivorous fishes enable the ectoparasites to penetrate the skin and gills easily.

Brazenor et al., (2020) reported that the effect of temperature may affect reproduction most common parasite like *Neobenedenia girellae* (Platyhelminthes: Monogenea). When the temperature is about 20°C and 25°C then slower reproduction of larger egg that were energy dense. But when temperature become 30°C the sexual maturity is faster, reproduces for a shorter period with small size eggs and less energy eggs at a faster rate. The temperature is 30°C the higher proportions of saturated fatty acids and larva survive in warm condition due to regulations of cell membrane. They reported that fish ecto-parasites have evolved substantial reproductive and metabolic flexibility to maximize infection success under variable environmental conditions.

Paula, (2020) reported that the fish physiology, behavior and survival maybe affected by common fish ecto-parasite like *Gnathiid* isopods. *Gnathiid* juveniles may feed fish blood.

Kumar et al. (2018) reported Prevalence of *Argulus* fish parasites in *L. rohita* maximum 15.2% (maximum) and in case of *C. idella* 12.0%.

Ashokan, Mundaganur, and Mundaganur (2013) reported various type of disease in fish skin, their weight may be reduced and maturation of fish may be prolonged About 500 fishes ecto and endo-parasite were analyzed. This result concludes that the *Labeo rohita* fishes were infected by Ciliophorans, Monogeneans, Nematodes, Cnidarians and Trematodes. These parasites are mainly found on gills, body surface, skin, stomach and intestine.

Nedic et al., (2018) reported that ecto-parasites (*Chilodonella cyprinid* and *Ichthyophthirius multifiliis*) were study in 22 fish species (400 individual) from Sava River. Parasitology studied biological control of fish disease the two major important fish.

Prasad et al., (2018) reported that 321 fish parasite was recorded from 28 fish sample during the study period. Parasites were collected from skin, fins, mucus and gills. These parasites were two protozoans (*Trichodina*, *Ichthyophthirius mltifilis*) two crustaceans (*Argulus* and *Lernaea*) and two monogeneans (*Dactylogyrus* and *Gyrodactylus*). The highest number (57%) was found to be *Dactylogyrus* spp. and lowest (0.6%) was found to be *Gyrodactylus*. The prevalence record was found to be

highest (75%) in small fishes whereas mean intensity (21.87%) and abundance (8.8%) was found to be in larger fishes.

Zhe wang et al., (2017) conclude that phylogenetic study of two *Trichodina* species study were nested with in a clade including several freshwater *Trichodina* species. resulted in hyperplasia and injuries of the gill filaments.

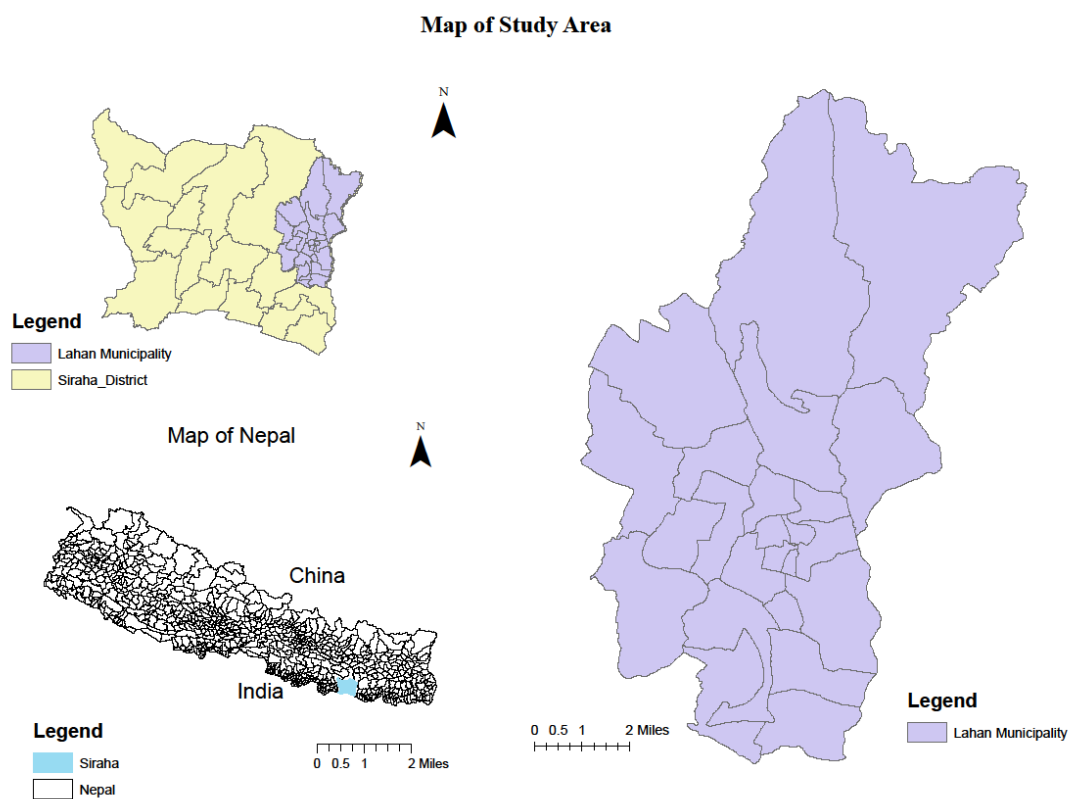
According to Jha and Bhujel (2012) reported that most common parasites were Protozoan, Crustacean, Helminthes and Fungus. The monogeneans parasites are (*Dactylogyrus* sp.) and Copepoda (*Lernaea cyprinacea*).

Walker et al. (2008) conclude that the life history stages of the destructive fish ecto-parasite *Argulus foliaceus* in eight species during late spring and summer. For adult lice, however, carp appeared to be the main host.

### 3. MATERIALS AND METHODS

#### 3.1. Study Area

The study area was Fisheries Development Center, Lahan, Siraha, Sagarmatha Zone of South –Eastern Nepal (fig.1). It is connected with Mahindra highway, which is also called as east- west highway. Lahan is located at the latitude 26. 717 and longitude of 86.483. It is an elevation of 111 meters above the sea level. Lahan fish farming center was established in 2039 B.S. by the union of FAO and UNDP. It occupies 39-hectare total area.



**Figure 1:** Map of study area

#### 3.2 Study Period

- The study was done in November to January. (2022)
- Temperature, pH and DO were collected month wise.

### **3.3 Physical Requirements:**

- The materials are needed for the study include:
- Forceps, Scissors, Microscope, Camera, Petridis, Slide, Coverslip and note book.
- Several wide mouthed bottles. (size related to the size of fish)
- Plastic Petri dish (size related to the size of the fish)
- Small or medium – size plastic vials for storage of parasite.
- pH meter, Thermometer and BOD bottle.
- Microscope.

### **3.4 Chemicals Requirements**

The Chemicals needed for this study include:

- 9-10 % of formalin solution used for the preservation and further identification of fish and fish parasites.
- 30% ethanol was added for the collection of fish sample.
- Normal saline, Alcohol series, DPX, Canada balsam and Glycerol AFA, 4% Formaldehyde, 30% ethanol.

### **3.5 Methods**

#### **3.5.1 Preliminary survey**

The basic information of site was collected with employer and officer of fish farm.

The physical parameters of water was recorded as average Temperature 24.66, pH 7.1 and DO 6.85.

#### **3.5.2 Collection of fish sample**

All together 60 fishes were collected as 15 sample of Naini, 15 sample of Common Carp, 15 sample of Grass Carp and 15 sample of Silver Carp. These fish sample were collected with the help of fisherman by using drift net. These collected sample were brought to Central Department of Zoology, Kirtipur for the identification of fish parasites. These fish sample were divided into three groups according to length of

fish. The small length group of fish belongs to (10cm) medium length group belongs to (10-15cm) and larger length group belongs to (>15cm).

### **3.5.3 Collection of fish parasites**

Fish ecto- parasites were collected by using magnifying glass. (Mofasshalin.2012). The parasites were collected from external surface of it include skin, fin and scale. The doubtful portion was remove and preserve it in normal saline solution (0.75%). The mucus of fish was transferred on microscope slide and added one drop of normal saline solution covered it with coverslip. The doubt full portion was remove and prepare wet mount. (Mofasshalin.2012, Li et al., 2008 Van As and Basson 1989., Gussev 1985. Fish operculum and gills were removed with scissor and transferred to slide and saline finally the ecto-parasites of fish was examined under 40X of compound microscope.

### **3.5.4 The method which are used for collecting, fixing, staining, and moulting of parasite specimens**

For the detection of parasites skin , gills and fins were examined.

#### **i. Protozoa**

The protozoan parasites were detecting when it scraped separately from the skin and gills into the slide and mucus systematically spread with a help of cover slip. The protozoans are exposed to the fixative it for about 15minute and washed it with alcohol containing a drop of iodine solution. Finally, slide was made by using DPX Fernando et al. (1972).

#### **ii. Monogenean**

The gills of fish were cut out and examined under a microscope at 40X Vigorously, moving worms were separated from the gills with a pipette and fixed under a cover slip to Gussev (1983).

#### **iii. Crustacean**

The specimens of crustaceans were collected, cleaned with saline and preserved it in 70% alcohol. They were then stained and cleared with Lactophenol and mounted in Canada balsam Fernando, et al. (1972).

### 3.6 Data interpretation

The total number of parasites were determined by numerical count. The qualitative and quantitative data was analyzed by using bio- statistical parameters are Mean intensity and Abundance of fish parasites and compare to the analyzed data.

$$\text{Mean intensity (\%)} = \frac{\text{Total number of parasites}}{\text{Total number of infected host}} \times 100$$

$$\text{Abundance (\%)} = \frac{\text{Total number of Parasites}}{\text{Total number of host species}} \times 100$$

## 4. RESULTS

### 4.1 Parasites identification

Altogether 249 parasites were reported which belong to three genera and 28 fish sample infected out of 60. The protozoan parasites were not reported in this study. One species of monogenic parasites were reported that is *Dactylogyrus* where as two parasitic species were recorded that is *Argulus* and *Lernaea*. The highest number of parasitic record was found to be *Argulus* (47.79%) and *Dactylogyrus* (18.47%) (Table: 1, 2, 3 and 4).

**Table 1:** Parasites frequency in Naini

S. N.	Parasites spp.	Length <10 cm	Length 10-15cm	Length >15cm
1	<i>Dactylogyrus spp.</i>	2	4	10
2	<i>Argulus spp.</i>	18	10	16
3	<i>Lernaea spp.</i>	10	2	30

**Table 2:** Parasites frequency in Common carp.

S. N.	Parasites spp.	Parasites <10 cm	Parasites 10-15cm	Parasites >15cm
1	<i>Dactylogyrus spp.</i>	2	1	4
2	<i>Argulus spp.</i>	6	3	18
3	<i>Lernaea spp.</i>	3	4	8

**Table 3:** Parasites frequency in Grass carp.

S. N.	Parasites spp.	Parasites <10 cm	Parasites 10-15cm	Parasites >15cm
1	<i>Dactylogyrus spp.</i>	3	4	8
2	<i>Argulus spp.</i>	8	5	15
3	<i>Larnea spp.</i>	2	1	10

**Table 4:** Parasites frequency in Silver carp.

S. N.	Parasites spp.	Parasites <10 cm	Parasites 10-15cm	Parasites >15cm
1	<i>Dactylogyrus spp.</i>	3	1	4
2	<i>Argulus spp.</i>	6	2	12
3	<i>Lernaea spp.</i>	4	2	8

**Table 5:** Identified fish parasites and their infection sites

S.N.	Parasites		Total number of parasites	% of parasites	Site of infection
1	Monogenea	<i>Dactylogyrus sp.</i>	46	18.47	Skin, Fins, Gills
2	Crustacea	<i>Argulus spp.</i>	119	47.79	Skin, Gills
		<i>Lernaea spp.</i>	84	33.73	Skin, Gills
	Total genus = 3		Total = 249	Total = 100	

Total Monogenean parasites was found 46

Total Crustacean parasites was found 203 (Table 5).

Monogenean parasites was present fins also.

#### 4.1.1 Calculation of mean intensity and abundance of fish parasite in different length group in graph.

##### Mean intensity of parasite in Naini

The highest mean intensity of fish parasite was 19% (>15cm) whereas lowest 8% was recorded in lowest length group of fish (<10cm). In medium length group mean intensity was found to be 16% (Fig.2)

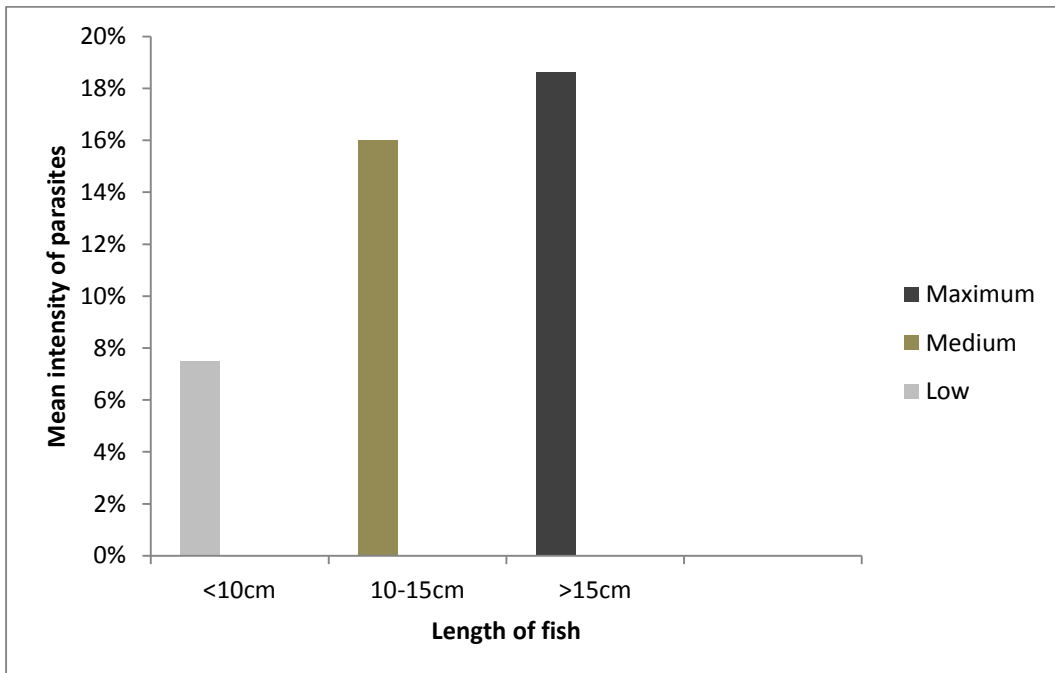


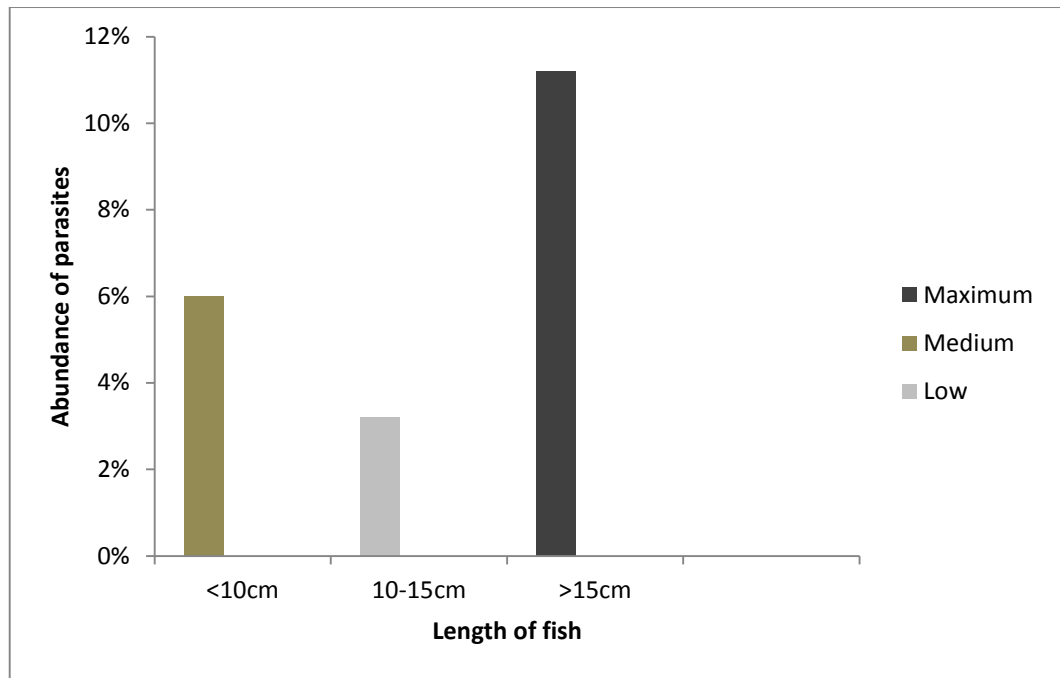
Figure 2: Mean intensity of parasite (Naini).

##### Abundance of parasite in Naini

Abundance of fish parasite of Naini length of fish about (>15cm) and has highest abundance of fish parasite (11%).

Lowest abundance of fish parasite (3%) recorded in medium length group of fish (10-15cm).

6% abundance found to be lowest length group of fish (<10cm) (Fig.3).



**Figure 3:** Abundance of parasite (Naini)

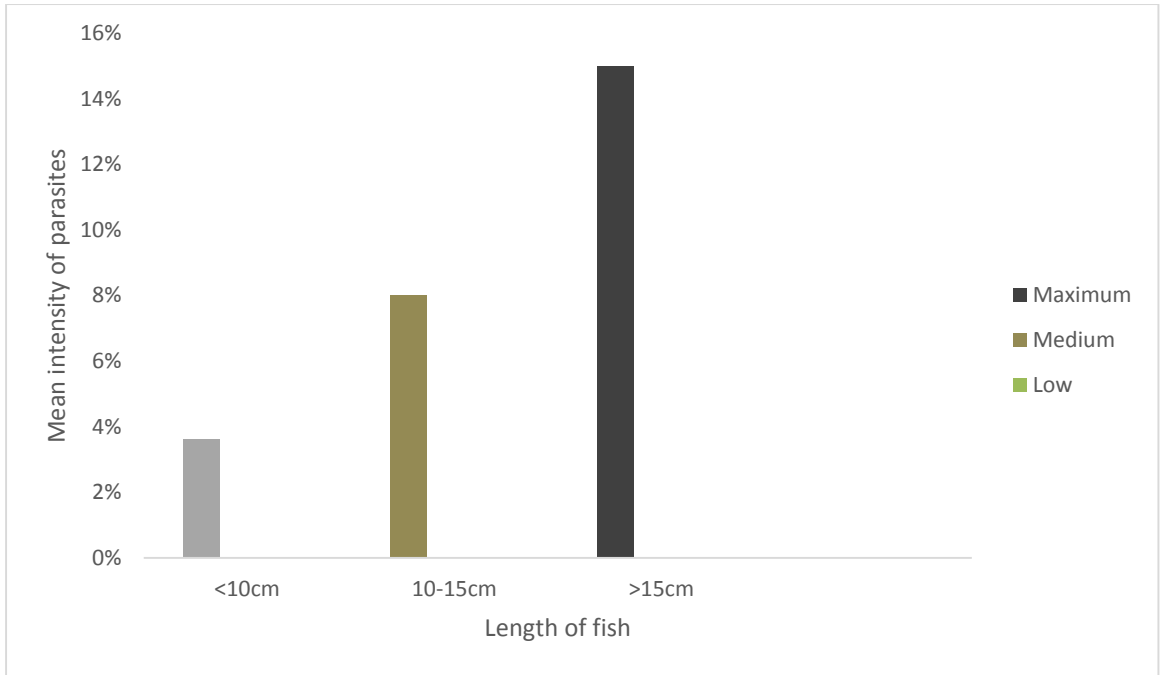
#### **4.1.2 Calculation of mean intensity and abundance of parasite in different length group in graph**

##### **Mean intensity of parasite in Common carp**

Mean intensity of fish parasite of Common carp fish length of fish about (>15cm) and has highest mean intensity of fish parasite (15%).

(4%) Lowest intensity of fish parasite recorded in lowest length group of fish (<10cm).

(8%) Mean intensity found to be medium length group of fish (10-15cm) (Fig.4).



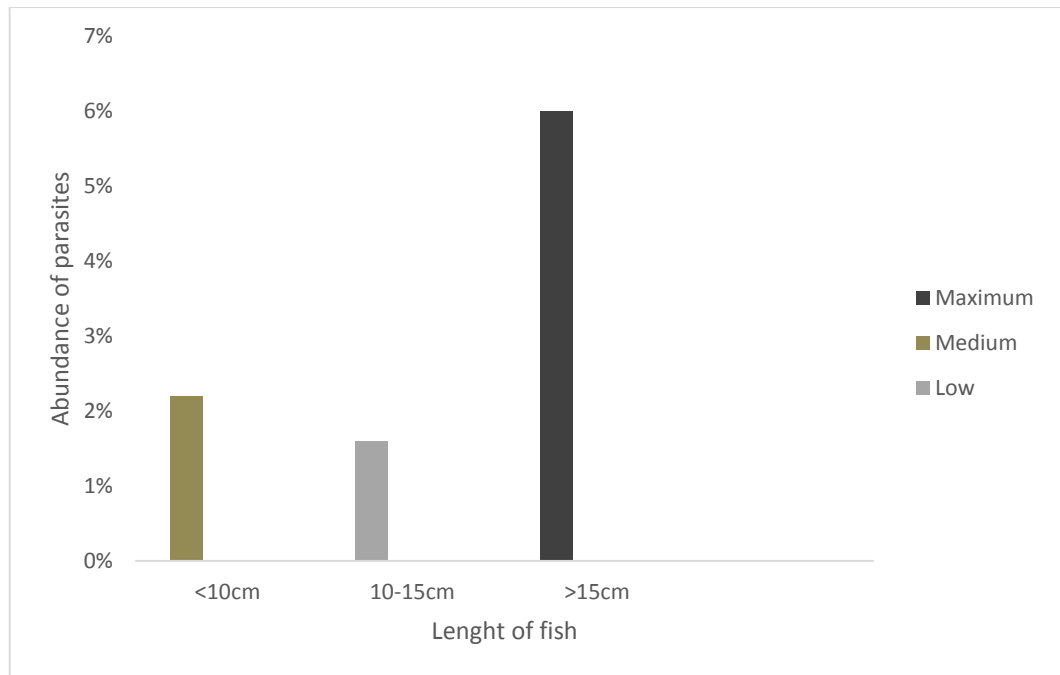
**Figure 4:** Mean intensity of parasite (Common carp)

**Abundance of fish parasite of Common Carp.**

Abundance of fish parasite of Common carp length of fish about (>15cm) and has highest abundance of fish parasite (6 %).

Lowest abundance of fish parasite (1.6 %) recorded in medium length group of fish (10-15cm).

(2%) abundance found to be lowest length group of fish (<10cm) (Fig.5)



**Figure 5:** Abundance of parasite (Common carp)

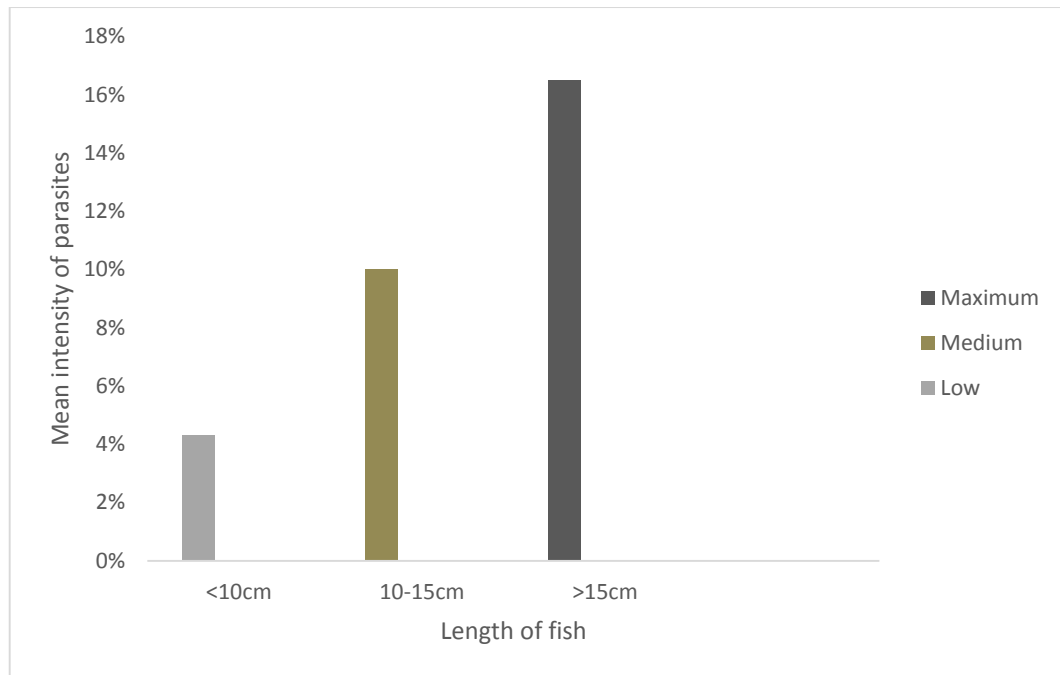
#### **4.1.3 Calculation of mean intensity and abundance of parasite in different length group in graph**

##### **Mean intensity of fish parasite of Grass carp.**

Mean intensity of fish parasite of Grass carp fish length of fish about (>15cm) and has highest mean intensity of fish parasite (17%).

Lowest intensity of fish parasite (4%) recorded in lowest length group of fish (<10cm).

(10%) Mean intensity found to be medium length group of fish (10-15cm) (Fig.6).



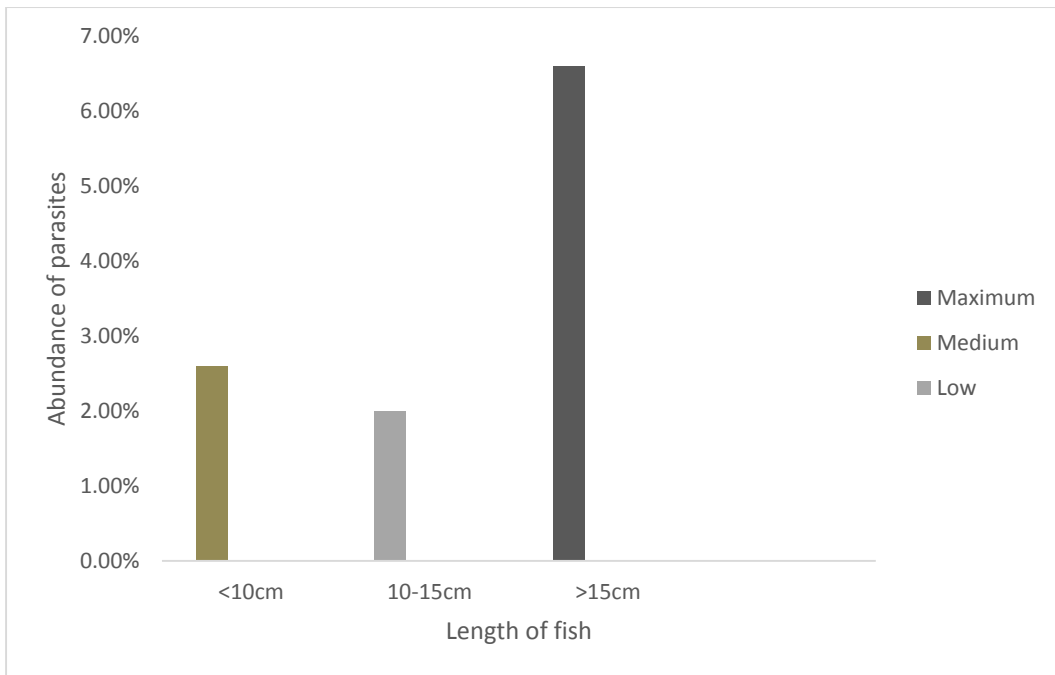
**Figure 6:** Mean intensity of parasite (Grass carp)

**Abundance of fish parasite of Grass Carp.**

Abundance of fish parasite of Grass carp length of fish about (>15cm) and has highest abundance of fish parasite (6.60 %).

Lowest abundance of fish parasite (2 %) recorded in medium length group of fish (10-15cm).

(2.60 %) Abundance found to be lowest length group of fish (<10cm) (Fig.7)



**Figure 7:** Abundance of parasite (Grass carp)

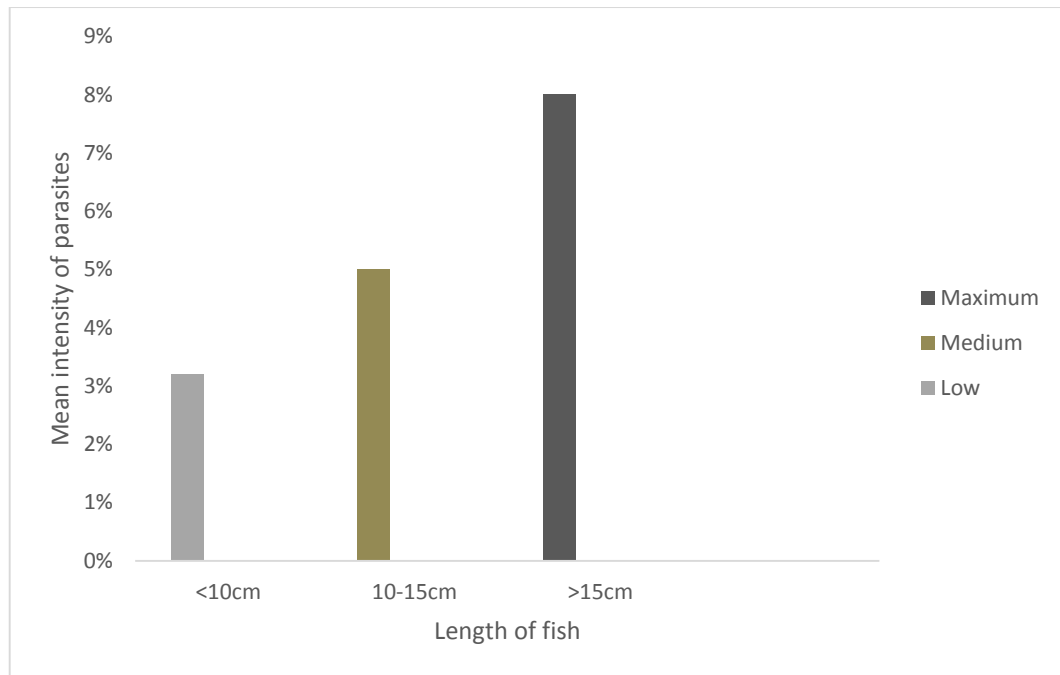
#### **4.1.4 Calculation of mean intensity and abundance of parasite in different length group in graph**

##### **Mean intensity of fish parasite of Silver Carp.**

Mean intensity of fish parasite of Silver carp fish length of fish about (>15cm) and has highest mean intensity of fish parasite (8 %).

Lowest intensity of fish parasite (3 %) recorded in lowest length group of fish (<10cm).

(5 %) Mean intensity found to be medium length group of fish (10-15cm). (Fig. 8)



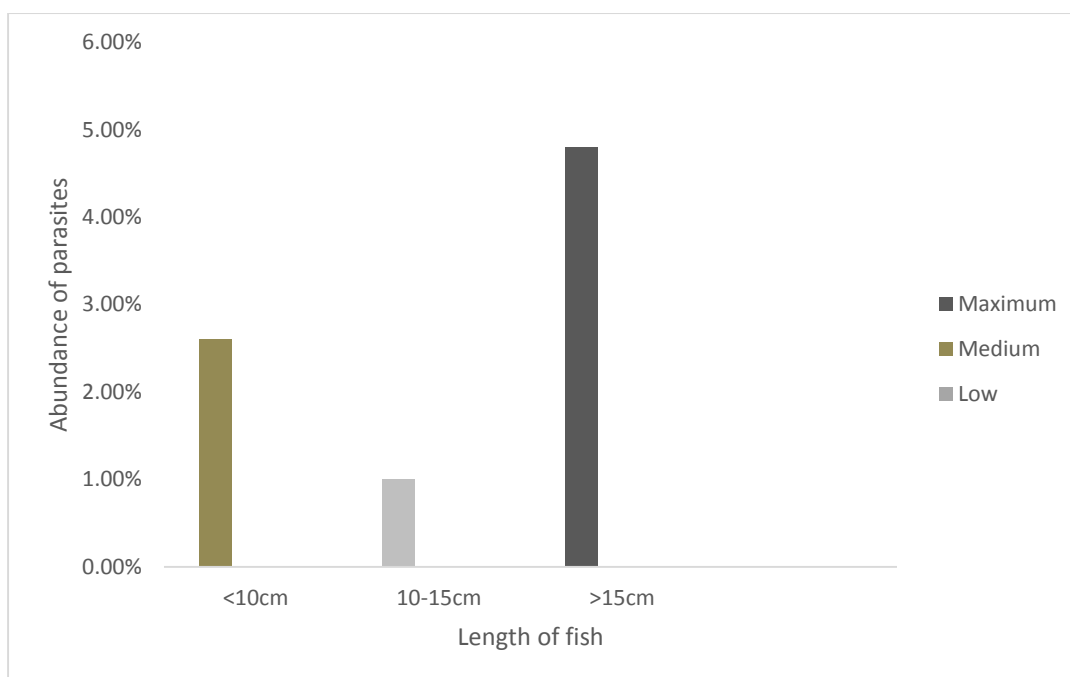
**Figure 8:** Mean intensity of parasite (Silver carp)

**Abundance of fish parasite of Silver Carp.**

Abundance of fish parasite of Silver carp length of fish about (>15cm) and has highest abundance of fish parasite (4.80 %).

Lowest abundance of fish parasite (1 %) recorded in medium length group of fish (10-15cm).

(2.60 %) abundance found to be lowest length group of fish (<10cm) (Fig.9)



**Figure 9:** Abundance of parasite (Silver carp)

**Table 6:** The calculated value of fish parasites, Mean intensity, and Abundance

S.N.	Name of fish sample	Length of fish group in cm	Number of infected fish sample	Total number of fish parasites recorded	Mean intensity of fish parasite in unit	Abundance of fish parasite in unit
1	Naini fish	<10	4	30	7.5	6
		10-15	1	16	16	3.2
		>15	3	56	18.6	11.2
2	Common carp	<10	3	11	3.6	2.2
		10-15	1	8	8	1.6
		>15	2	30	15	6
3	Grass carp	<10	3	13	4.3	2.2
		10-15	1	10	10	2
		>15	2	33	16.5	6.6
4	Silver carp	<10	4	13	3.2	2.6
		10-15	1	5	5	1
		>15	3	24	8	4.8

Highest mean intensity and abundance was found in larger length group of Naini.

Highest mean intensity and abundance was found in larger length group of Common carp.

Highest mean intensity and abundance was found in larger length group of Grass carp.

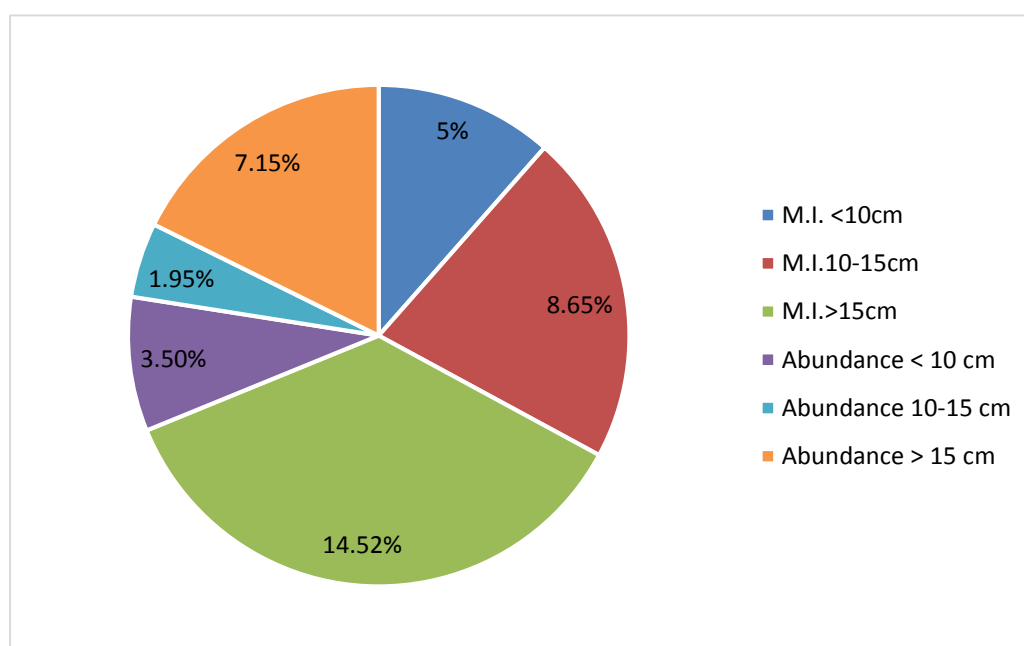
Highest mean intensity and abundance was found in larger length group of Silver carp.

**Table 7:** Mean intensity and Abundance of fish parasites in different length group of fishes.

S.N.	Calculated value	Below 10cm length (%)	Between 10-15cm length (%)	Above 15cm in length (%)
1	Mean intensity	4.65%	8.65%	14.52%
2	Abundance	3.5%	1.95%	7.15%

Table 7: Conclude that the highest mean intensity and abundance was found in largest length group of fishes.

#### 4.2 Mean intensity and Abundance



**Figure10:** Mean intensity (MI) and Abundance of fish parasites compared in different length group.

## 5. DISCUSSION

This research work, three genera of fish parasites were recorded with two Crustaceans (*Argulus* and *Lernaea*) and one were Monogenean (*Dactylogyrus* sp.) Monogenean's parasites were attached on gills, skin and fins. Crustaceans parasites were attached on skin, fins and scale. *Argulus* was identified by Hoffman, (1977) in fresh water fishes. The maximum parasitic infection caused by *Argulus* (47.79%) and lowest in *Dactylogyrus* sp. (18.47%). This result was dissimilar to Prasad, Yadav. and Limbu, (2018) whose result was *Trichodina* spp. (11.83%) it was highest and *Argulus* spp. (5.3%). was lowest. The mean intensity value was found to be (14.51%) and Abundance was (7.15) This result was similar with Peddinti, et al. (2021). they reported that the Prevalence infection was (63.9%), Abundance (13.9) and Mean intensity was (44.3).

*Argulus* spp. has wide range capacity to tolerate high temperature. The infection of *Argulus* parasite was highest shown in lower length group. (Sahoo, and Saurabh, 2018). *Argulus* are large parasite it may attached to gills of fish and it is easily seen in naked eye. In this study, the three parasites species were identified from fish host. This parasites was recorded from Naini and Common carp frequently in the fish farm this has to be controlled as it can induce significant morbidity and mortality in cultured fish population (Yamaguti 1963; Benz et al., 2001; Northcott et al., 1997; Wilson, 1902).

In the present study Monogenean parasites was next to *Argulus* and *Lernaea* present in fins, skin and gills (Jha and Bhujel, 2012). Ahmed (1981) reported that several species *Dactylogyrus* sp. may become pathogenic interfering with feeding and respiration in small fish. Zitnan, (1978), Pojmanska, and Chabros, (1993) conclude that the infection of *Dactylogyrus* sp. were higher in small length fish and in the largest size fish and lower in medium size fish. This result was similar to our research.

## 6. CONCLUSION AND RECOMMENDATIONS

### 6.1 Conclusion

During the time of research study, altogether 249 parasites were recorded belonging to three genus. Monogenean parasites - *Dactylogyrus* sp. and Crustaceans parasites - *Argulus* and *Lernaea* was recorded. The Monogenean parasite was found on scales, fins Whereas, Crustaceans parasites were found only on skin and scales. The parasitic infection in Naini fish was higher as compared to other commercial fishes. The highest mean intensity (14.52%) and abundance (7.15%) was found in larger fish length group. Physico water parameters of pond protects the aquatic ecosystem and less parasitic infection in the fish was seen. This research work will further support to research on commercial fishes in Fishery, Development, Center, Lahan , Siraha , Nepal.

### 6.2 Recommendations

- Too frequently handling, and transport of pond fish should be avoided.
- Well -equipped laboratories necessary in fish farm in order to check fish parasite.
- During winter season to protect from parasitic infestation they can use antibiotic.

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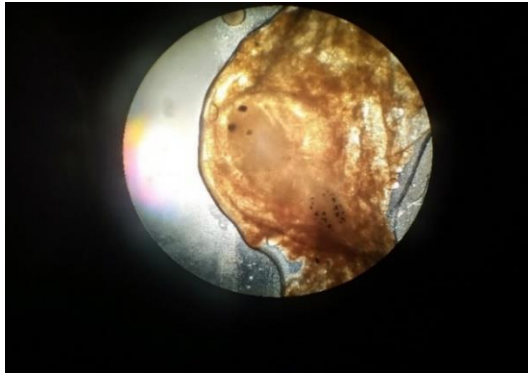
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## **APPENDIX-I**

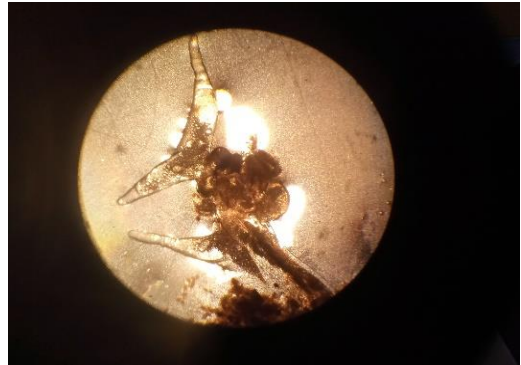
### **Questionnaires survey**

1. Which fishes are selling most in market?
2. Why common carp fishes are selling mostly in market?
3. Would you know about the fish disease?
4. Would you tell me any name of fish parasites?
5. How many varieties of fish are selling in market by fish farm?
6. Have you any idea how fish parasite occurs in fish?
7. Do you have any idea to protect fish from parasitic infection?
8. Do to parasitic infection in fish it loss aquatic biodiversity or not?
9. Due to parasitic infection in fish it may cause any types of disease in human?
10. Have you any knowledge about chemical treatment of fish disease?

## PHOTOPLATE – Showing parasites and working places



**Photo: 1** *Argulus* spp. found in gills of fish (40x)



**Photo: 2** *Lernaea* spp. found on skin of fish (40x)



**Photo: 3** Fish was infected by *Lernaea* spp.



**Photo: 4** *Dactylogyrus* spp. found in gills (40x)



**Photo: 5** while working in lab



**Photo: 6** Questionnaire survey with officer of fish farm