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# Parasitological Investigation on Commercially Important Fish and Crustacean Species Collected from the TIGEM (Dortyol Turkey) Ponds

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**Abstract:** This study has been conducted in Dortyol TIGEM (General Directorate of Agricultural Enterprises) ponds where Mustafa Kemal University, Faculty of Fisheries, Dortyol-Yeniyurt,Turkey, Fishery Products Research and Application Unit is established. In this field which has a potential for fishery product farming, no pervious study has been detected on parasite existence. In order to determine the existence of parasite organisms in the fishery products living in TIGEM ponds in Dortyol district where local fishing activities are being conducted within the borders of Hatay province and it is expected to project and implement advanced level of farming activities in the near future, 550 fish and 32 arthropod samples (167 gray mullets *(Mugil cephalus* Linnaeus, 1758), 188 tilapias (*Tilapia zilli* Gervais, 1848), 70 sea bass (*Dicentrarchus labrax* Linnaeus, 1758), 125 marmid (*Acanthabrama marmid* Heckel, 1843), 32 blue crab (*Callinectes sapidus* Rathbun, 1896)) have been taken and examined during the year between April 16th, 2007 and March 17th, 2008. In this study, from Dortyol TIGEM ponds, *Diplozoon paradoxum* (Nordman, 1832) and T*etraonchus* sp. (Diesing, 1858) have been detected in *Tilapia zilli* (Gervais, 1848) and *Diplozoon paradoxum* (Nordman, 1832) and *Tetraonchus* sp. (Diesing, 1858), which is a Monogenean parasite has been detected in *Acanthobrama marmid* (Heckel, 1843) as a new host and is being reported for the first time.

**Key words:** *Tetraonchus* sp., *Diplozoon paradoxum*, *Tilapia zilli*, *Acanthobrama marmid*, Dortyol-TIGEM ponds, Turkey

## INTRODUCTION

Fishery products are important sources which meet the protein need of millions of people in the world. It is also a commercial industry which provides a living for many people. Fishery products are also very important for plant and human health due to their special components which are valuable in pharmacological terms. In the last two decades, global fishery product farming has reached a significant level; this industry is known for predicting health problems beforehand and putting into practice the required prophylactic techniques.

Predicting the diseases and pestilent in the nature provide valuable information for producing relevant zoogeographic maps and establishing farming businesses. These pieces of information allow for predicting the pathologies that can occur during farming thus, they make sure that potential financial losses can be minimized within the framework of risk management (Genc, 2007). It is argued that in addition to excessive and insensible fishing, the effect of agricultural, industrial and urban pollutants can each passing day cause grave losses in the biological diversity and natural stocks in watery areas, especially lagoon lakes (Hoole *et al*., 2001).

Parasites are the natural living beings of the environment in which they live and they pose negative impacts on the living being with which they cohabit. There are many fish parasite types which can be classified as endoparasites and ectoparasites. Parasites are pests which can choose the skins, fins, bronchia and several internal organs of the fish and can parasite in a manner unique to the tissue or the host. Parasites settling in the skin area can cause several disorders in epithel tissues; those which settle in the branchia can cause respiration disorder and death (Chambers and Sikkel, 2002; Smit *et al*., 2003; Genc, 2007).

Death can occur during the period between diagnosis of an infection in fish and taking necessary measures which can pose enormous economic losses for the business. What makes more sense in fishery product farming is to protect the fish before the diseaseoccurs

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rather than trying to cure the disease. For good protection, the disease factor has to be known very well and measures that will be taken have to be identified soundly (Arda *et al.*, 2002).

In the country where fishing activities mainly consist of hunting, it is indisputable that the share of Turkish fish-farming in the global market has to increase. It is expected that the scientific researches conducted in farming for this reason will have enormous contributions to production. Most of the existing researches are related to the detection and rates of fish parasites; there are few studies conducted on the distribution of parasite existence according to months, seasons, temperature and salt content (Ozturk, 2005).

This study has been conducted in Dortyol TIGEM ponds, Hatay, Turkey, an area where farming activities will begin. Within the hypothesis, it has been projected to choose as research area the regions with fishery product farming potential. This case made it necessary to give priority to parasite existence in the studies which would be conducted on fish health. As a result of the literature search, no previous studies on parasite existence in Dortyol TIGEM ponds have been detected.

## MATERIALS AND METHODS

Lagoon ponds located in Hatay Province, Dortyol district, Yeniyurt town on the coast of Iskenderun Bay at 36°54'N-36°05'E coordinates were determined as sampling and research area. The chosen pond has an area of 50,000 $m^2$ sec and its depth is 5-7 m; it is connected to the sea with a channel whose width is some 50 cm. A sample consisting of 550 fish and 32 arthropods (167 gray mullets, 188 tilapias, 70 sea basses, 125 marmids and 32 blue crabs) obtained from the ponds with fishing method have been used as examination materials.

For measuring the size of samples, mm precision measurement board were used for measuring their weight, 1 g precision digital scale (AND SK-5001WP) was employed. Disposable gloves, bisturis, scissors, forceps and petri plates were used for examination of parasites. Stereo-microscope was used for viewing and counting parasite samples. Canada balsam and transparent balsam (entellan), shaved glass slide, coverglass and needle were used for creating fixed preparations from collected samples. For preserving the samples, 70% ethyl alcohol and 4% formaldehyde and a closed plastic container were employed.

In the course of the study, samples obtained through fishing were placed in separate bags and transported to Fishery Products Faculty Laboratory live in the water of their natural habitats in cold transportation container; their Total Size (TS) was measured with a mm precision ruler and Live Weight (LW) was measured with 1 g precision digital scale; both figures were recorded. For ectoparasite examination, mucous was scraped with spatula from skin surface, fins and oral cavity and parts were taken from branchia with dissection process which were then used for the preparation. Samples were examined with fresh preparation method which consisted of glass-covering on the sample which became fuzzy on the microscope slide in one drop of physiological salty water (PSW: serum physiological 8-9% NaCl).

Following every fresh examination which was conducted rapidly, fixed preparations according to their numbers were created from the preparations in which parasites were detected. After becoming transparent in a drop of glycerin, excessive part of the solution was removed with a blotting paper and glass-covering was conducted after one drop of entellan was dropped. Reference was made to Malmberg (1970), Harris (1982) and Koyuncu and Cengizler (2002) for diagnosis. Prevalence (%) and average density were calculated according to Bush *et al.* (1997). Prevalence was calculated as the percentage of number of parasited fish which corresponded to the total number of samples. Average density was calculated as the ratio of total number of parasited fish to average number of parasites.

Morphological features of parasites were magnified (×4, 10, 20, 40) under Olympus CH20 brand microscope and micro-photographed digitally with Nicon 4500 digital camera.

In examinations, reference was made to the studies of researchers who have a say in the field, namely Tavolga and Nigrelli (1947); Bauer (1959); Bykhovskaya-Pavlovskaya (1962); Markevich (1963); Schubet (1966); Thomas *et al.* (1966); Wellborn (1967); Lom (1970); Nigrelli *et al.* (1976); Hoffman (1978); Bylund *et al.* (1980); Ekingen (1983); Lom and Schubert (1983); Viljoen and Van As (1983); Basson and Van As (1989); Lom and Dykova (1992) and Woo (1995).

In endoparasite examination, body cavities, muscles and internal organs (air bladders, livers, spleens, stomachs, gal bladders, muscles, hearts, brains and intestine contents) were examined for endoparasite existence. Samples were separated according to their species and total size and live weight values were calculated with Microsoft Office Excel program. During this calculation, parasited and non-parasited species and relations between them were assessed (Norusis, 1993).

## RESULTS AND DISCUSSION

Among the sample species, Table 1 shows the Live Weight (LW) and Total Size (TS) values of the species in which no parasites were detected. Table 2 shows the Live

Table 1: Live Weight (LW) and Total Size (TS) values of the species in which no parasites were detected

| Total number of examined non-parasited samples = 269 | Samples with no parasite finding Nn | Tsn (mm) | TSn precision (mm) | LWn (g) | LWn precision (g) |
|---|---|---|---|---|---|
| Gray mullet | 167 | 232.30±53.75 | 160-490 | 269.98±227.59 | 57.3-1139 |
| Sea bass | 70 | 204.47±33.45 | 136-280 | 117.40±70.090 | 45.2-278 |
| Blue crab | 32 | 146.29±9.090 | 121.4-157 | 205.63±16.610 | 165-221 |

Table 2: Live Weight (LW) and Total Size (TS) values of parasited and non-parasited tilapia samples

| Seasons | Samples with no parasite finding Nn | TSn (mm) | TSn precision (mm) | LWn (g) | LWn precision (g) |
|---|---|---|---|---|---|
| Summer (41) | 41 | 176.83±50.31 | 95-231 | 130.04±70.48 | 18.12-196.5 |
| Fall (26) | 26 | 145.35±27.47 | 108-193 | 85.19±41.26 | 32.15-158.5 |
| Winter (29) | 29 | 180.45±26.12 | 140-213 | 133.57±38.15 | 65.4-174.30 |
| Spring (92) | 63 | 145.30±37.54 | 93-228 | 85.16±55.59 | 17.5-194.00 |
| General (188) | 159 | 161.99±19.29 | 93-231 | 108.49±26.96 | 17.5-196.50 |

| Seasons | Samples with parasite finding Np | Tsn (mm) | TSn precision (mm) | LWn (g) | LWn precision (g) | Parasite species and population *Tetraonchus* sp. | *D. paradoxum* | Prevalence (%) |
|---|---|---|---|---|---|---|---|---|
| Summer (41) | - | - | - | - | - | - | - | - |
| Fall (26) | - | - | - | - | - | - | - | - |
| Winter (29) | 29* | 155.04±51.31 | 93-223 | 97.19±70.62 | 16-191.8 | 65 | - | 31.52* |
| Spring (92) | 4** | 198.0±34.19 | 150-223 | 153.97±53.22 | 78-191.8 | - | 11 | 4.17** |
| General (188) | 29* | 155.04±51.31 | 93-223 | 97.19±70.62 | 16-191.8 | 65 | 11 | 15.43* |

**Tetraonchus* sp., ** *Diplozoon paradoxum*

Table 3: Live Weight (LW), Total Size (TS) and prevalence values of parasited and non-parasited marmid samples

| Seasons | Samples with no parasite finding Nn | TSn (mm) | TSn precision (mm) | LWn (g) | LWn precision (g) |
|---|---|---|---|---|---|
| Summer (36) | 21 | 169.19±65.35 | 74-278 | 51.36±38.44 | 6-115 |
| Fall (36) | 22 | 159.59±65.44 | 98-273 | 44.63±38.01 | 8.6-110 |
| Winter (20) | 20 | 144.55±65.48 | 77-290 | 36.02±38.09 | 6-130.9 |
| Spring (33) | 20 | 149.05±55.77 | 90-289 | 40.22±34.31 | 127.2-7.7 |
| General (125) | 83 | 155.60±11.04 | 74-290 | 43.06±6.56 | 6-130.9 |

| Seasons | Samples with parasite finding Np | Tsn (mm) | TSn precision (mm) | Lwn (g) | LWn precision (g) | Parasite species and population *Tetraonchus* sp. | *D. paradoxum* | Prevalence (%) |
|---|---|---|---|---|---|---|---|---|
| Summer (36) | 15 | 161.47±54.14 | 99-261 | 45.23±31.88 | 8.7-100 | 28 | - | 41.67 |
| Fall (36) | 14 | 140.64±65.09 | 71-268 | 38.59±36.0 | 6-106.3 | 17 | - | 38.88 |
| Winter (20) | - | - | - | - | - | - | - | - |
| Spring (33) | 13 | 170.92±25.19 | 126-208 | 54.75±17.27 | 18.3-76 | 64 | - | 39.39 |
| General (125) | 42 | 157.67±15.49 | 71-268 | 46.19±8.12 | 6-106.3 | 109 | - | 33.60 |

Weight (LW) and Total Size (TS) values of parasited and non-parasited sample tilapias. Table 3 shows Live Weight (LW), Total Size (TS) and prevalence values of parasited and non-parasited sample marmids.

In the samples, *Tetraonchus* sp. and *Diplozoon paradoxum* attached to the branchia lamellas were detected. Number of parasited samples among examined fishery products (Np) was detected as 71 and number of non-parasited samples (Nn) was found as 511.

In total, 167 gray mullets (*Mugil cephalus*), 70 sea basses (*Dicentrarchus labrax*), 32 blue crabs (*Callinectes sapidus*) were examined based on which curves and related exponential curves as well as curve equations were calculated from the size and weight figures of the subjects obtained. And no parasites were detected in these samples (Table 1). In total, 188 tilapias (*Tilapia zilli*) and 125 marmids (*Acanthobrama marmid*) were examined. Number of non-parasited samples in the tilapia sample group was found as 159. Monogenean trematod was detected in 29 subjects. Prevalence of the *Tetraonchus* sp. (Fig. 1a, b) and *Diplozoon paradoxum*. Figure 2a, b infection detected in the branchia of the sampled subjects was found to be at the level of 15.43%.

In marmids, monogenean trematod was detected in 42 subjects. Prevalence of the *Tetraonchus* sp. and *Diplozoon paradoxum* infection detected in the branchia of the sampled subjects was found to be at the level of 33.60%. Findings indicate that with fishing practice conducted with fishnets with different porosity sizes throughout the year, the attained level of sampling is

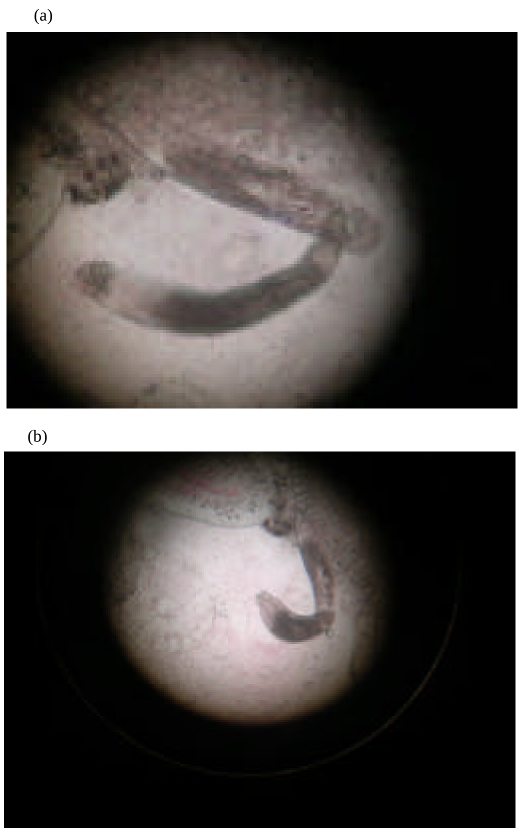


Fig. 1: *Tetraonchus* sp. (Orjinal)

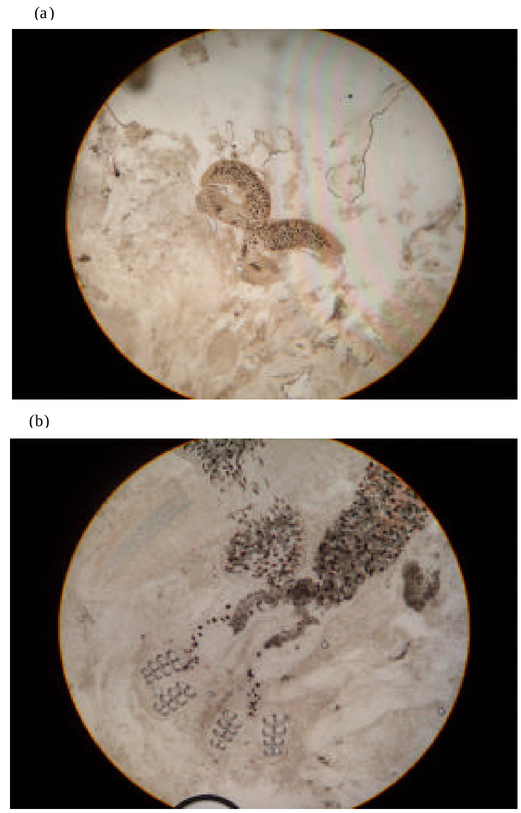


Fig. 2: *Diplozoon paradoxum* Nordman, 1832 (Orjinal)

is representative of almost the entire population. Accordingly, *Tetraonchus* sp. which is a Monogenean parasite was isolated from *Tilapia zilli* and *Acanthobrama marmid* and *Diplozoon paradoxum* was isolated only from Tilapia samples.

*Tetraonchus* sp. which was isolated from branchia epithels had been reported before from parts of Turkey other than Dortyol TIGEM ponds-Hatay and areas of the world (Dechtiar, 1972; Ozturk *et al*., 2000; Ozturk, 2005; Simkova *et al*., 2003; Kearn, 1978; Harris *et al*., 2004; Leblanc *et al*., 2006). *Diplozoon paradoxum* is reported from Dortyol TIGEM ponds for the first time but it had also been reported from other parts of Turkey and the globe (Hermann and Klinke 1961; Halton *et al*., 1974; Kearn, 1978; Schmahl and Mehlhorn, 1985; Kagel and Taraschewski, 1993; Toksen *et al*., 1996; Ozturk and Altunel, 2002; Oktener, 2003; Aydogdu *et al*., 2008).

## CONCLUSION

In this study, both parasites whose existence has been determined without displaying an obvious pathology (epithelium inflammation proliferation and hyperemia and loss of live weight) in their hosts were reported to have lived in several fresh water and salty water systems of the world by previous researchers, the study is in accordance with their findings. From Dortyol TIGEM ponds, *Tilapia zilli* (Gervais 1848) has been recorded as host for *Diplozoon paradoxum* Nordman (1832) and *Tetraonchus* sp. Diesing (1858); for *Tetraonchus* sp. *Acanthobrama marmid* (Heckel 1843) has been recorded as a new host.

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