Prevalence of Crustacean Diseases in Cultured Marine Fishes in Suez Canal Area

Ahmed H. A[1], Maather M. El-Lamie [2], Hala M. El-Shishtawy [2]
[1]Suez Canal Aquaculture Company, [2]Dept. of Fish diseases and Management, Fac. of Vet. Medicine, Suez Canal University.

Abstract:
The present study was designed to investigate crustacean diseases affecting cultured marine fishes "*seabass (Dicentrarchus labrax), seabream (Sparus aurata)* and *Meagre (Argyrosomus regius)*". They were randomly collected from 4 private polyculture fish farms in the Suez Canal area and Damietta Governorates from December 2020 to November 2021. All examined fishes showed no pathognomonic clinical signs. Infested fishes had hemorrhages at different parts of the body. Some *S. aurata* were emaciated with abdominal distention and marbling of gills. Infested *D. labrax* showed marbling and sloughing of gill filaments with excessive mucous secretion while *A. regius* showed bulging of operculum in isopod-infested cases. The isolated crustaceans were identified as *Livoneca redmanii* and *Nerocila orbignyi* isopods from *A. regius* and *S. aurata, respectively, and Lernanthropus kroyeri* and *Caligus minimus* copepods from *D. labrax*. The total prevalence of crustacean infestation was 22.10%. The highest infestation was recorded in *D. labrax* (54.40%) followed by *S. aurata* (7.40%) and the lowest was recorded in *A.regius* (4.40%). *Caligus minimus* recorded the highest prevalence (9.30%) while *Livoneca redmanii* had the lowest prevalence (1.44%).

Key words: Cultured marine fish, *Dicentrarchus labrax, Sparus aurata, Argyrosomus regius,* crustacea, prevalence.

Introduction:

Worldwide, people obtain great part of their animal protein from fish and shell fish. The need for fish as a source of protein grows as the human population grows. Fish culture is a form of rearing aquatic organisms for commercial purposes, either in an open coastal ecosystem or in a controlled marine ecosystem ***(Soliman and Yacout, 2016).*** Aquaculture is the fastest growing food producing sector in the world. It develops, expands and intensifies in almost all regions of the world as global population increases ***(Haldén et al., 2014).*** European Seabass, Gilthead seabream and meagre are three of the chief marine fish species widely reared in Egypt ***(Khalil et al., 2014).*** Meagre *(Argyrosomus regius)* production has increased rapidly in the recent years, mainly due to high flesh quality and flavor,

fast growth, large size, high feed conversion rate and high adaptation capacities to environmental changes ***(Duncan et al., 2013).*** Egypt is the most important producer of meagre, which is cultured in brackish-water ponds, as a capture based aquaculture using fingerlings and juveniles from the Nile delta ***(Feidi, 2018).*** The European seabass (*Dicentrarchus labrax*) is the most important commercial fish widely cultured in Mediterranean areas and Egypt is one the biggest producer ***(FAO, 2013).*** Moreover, gilthead seabream (*Sparus aurata*) considered as main component of Egyptian mariculture ***(GAFRD 2014).*** Parasitic diseases affecting marine fishes are numerous and they cause high losses in marine culture sector in Egypt ***(Khalil et al., 2014).*** These parasites cause some diseases that closely linked to environmental deterioration and stress. For example, crustacean diseases that limit the development of intensified mariculture ***(Osman et al., 2014).*** Among marine fish parasites, about 25% of fish parasites are crustaceans (mainly copepods), branchiura and isopoda ***(Eiras et al., 2000).*** They affect growth, fecundity, and survival of wild hosts ***(Bayoumy and Baghdadi, 2013).***

Materials and Methods:

A. Fish:

A total of 204 cultured seabass *(Dicenrarchus labarx),* seabream *(Sparus aurata* and meagre *(Argyrosomus regius*) were randomly collected in different seasons (between December 2020 and November 2021) by the aid of fishermen and fishing gears. They were collected from 4 private earthen polyculture farms located in Suez Canal area and Damietta Governorates, Egypt. Farms were of an average area of (4200 m^2), average depth of (1.25 m). Water temperature during rearing period ranged from 12.5 C° during winter months to 28.5 C° during summer months. Oxygen content average was (6.5mg/L) during summer months, and (9.5 mg/L) during winter months (average of 7.7 mg/L). PH average value was 8.1. The salinity fluctuated between 18 g/L in winter and 30 g/L during summer months.

Examined *D. labrax, S. aurata and A. regius* range of body weights were (100-500g), (100-500 g) and (300-1000g), respectively. Immediately after collection, they were transported to the laboratory of Fish Diseases and Management Department, Faculty of Vet. Medicine, Suez Canal University alive in tank supplied with oxygen containing 1/3 of its volume water where the remaining volume was filled with air.

B. Clinical picture:

Live fish specimens were grossly examined for detection of any clinical abnormalities. Then postmortem examinations were done for all fish to found the internal abnormalities according to ***Amlacker (1970).***

C. Parasitological examination:

• Macroscopic examination:

Macroscopic examination was done by naked eyes and a magnifying lens. Skin, eyes, gills, fins, opercula and mouth cavity were dissected and examined for the presence of any crustacean parasites.

• Microscopic examination:

Skin scraping from Euthanized fish . Mucus and scales were transferred to slides with a drop of distilled water then covered with cover slips over them and then, examined microscopically ***(Lucky, 1977).***

• Smear preparations, and permanent slides:

The detected crustaceans were collected by a dissecting needle and a fine brush, kept in small vials and washed many times with distilled water, fixed in 3% formalin and preserved in an equal amount of (70% alcohol and 5% glycerin) in test tube and for permanent mount we need to make dehydration in ascending grades of alcohol 30, 50, 70, up to 100% cleared in glycerin and mounted in glycerin- gelatin **(Lucky, 1977),** then examined microscopically. Isopods were identified without mounting on slides.

Results:

Clinical examination:

Examined fishes showed no pathognomonic signs. The detected signs were aggregation near water inlets with gasping, rubbing bodies against pond boundaries with excessive mucous secretion. Some infested *S. aurata* revealed hemorrhagic areas at the tail and abdomen **(Fig. 1A)**, while some of them manifested emaciation with abdominal distention. On the other hand, some *S. aurata* gills had marbling appearance and excessive mucus secretion with attachment of crustacean isopods **(Fig.1B)**. Some naturally infested *D. labrax* showed hemorrhagic areas around mouth, at gill arch, pectoral fin, pelvic and anal fins **(Fig.1C).** Some showed excessive mucus secretion **(Fig.1D),** others had marbling appearance with attachment of Lernanthropus sp. that appears as black lines between gill filaments **(Fig.1 E)**. Some gill arches showed sloughing of their filaments **(Fig.1F)** as well as others revealed heavy infestation of Caligus sp. inside the mouth, on head and at the isthmus part of fish **(Fig.1G)**. Few of naturally infested *A. regius* manifested hemorrhages on eyes and at pectoral and pelvic fins. As well as some showed bulging of the operculum due to attachment of Isopods with excessive mucus secretion. **(Fig. 1H)**

Parasitological examination:

I- Copepods:

1. *Lernanthropus kroyeri*

It was isolated from the gills of *D. labrax*. The cephalon and the first thoracic segment are merged and form the cephalothorax part that contain pairs of antennules, antennae, maxillules, maxillae, and mandibles which belong to cephalic appendages and contain pair of maxillipeds and two pair of legs that

belongs to thoracic appendages. The trunk contains two or three pairs of legs, the genito-abdominal complex, and caudal rami. The parasite is narrow at the anterior part and become wider to the posterior part and the female parasite is containing the egg sacs (**Fig. 2 A &B**).

2. Caligus minimus

It was isolated from the mouth, isthmus and head part of *D. labrax*. The parasite consists of 4 parts cephalothorax, apron, genital complex and abdomen. The cephalothorax with an apron contains the third leg and tagma, also genital complex consists of the genital segment and the fourth leg - bearing segment of the thorax. The posterior part is the abdomen that contains the caudal rami and the egg sac was well identified. **(Fig. 3 A&B)**

II. Isopods:

1. *Livoneca redmanii*

It was isolated from gills of *A. regius*. It`s ovoid shape and slight curved to one side. It`s brown in color with dark chromatophores. It has 6 segments that decrease in width towards the posterior end. It contains one pair of eyes. The pereopods contain two pairs of antennae. The pereon becomes wider than the pleon **(Fig. 4 A&B).**

2. *Nerocila orbignyi*

It`s isolated from gills of *S. aurata.* It`s brown in color. It has trilobed cephalon and pair of large sized eyes. The pereon became wider toward the posterior. The pleon consists of six segments and narrower than pereon **(Figure 5 A&B)**.

Prevalence of infestation:

(Table 1) and (**Figure 6)** show the total parasitic infestation among the examined fishes.

(Table 2) and **(Figure 7)** show the prevalence of different crustacean infestation among the examined fish.

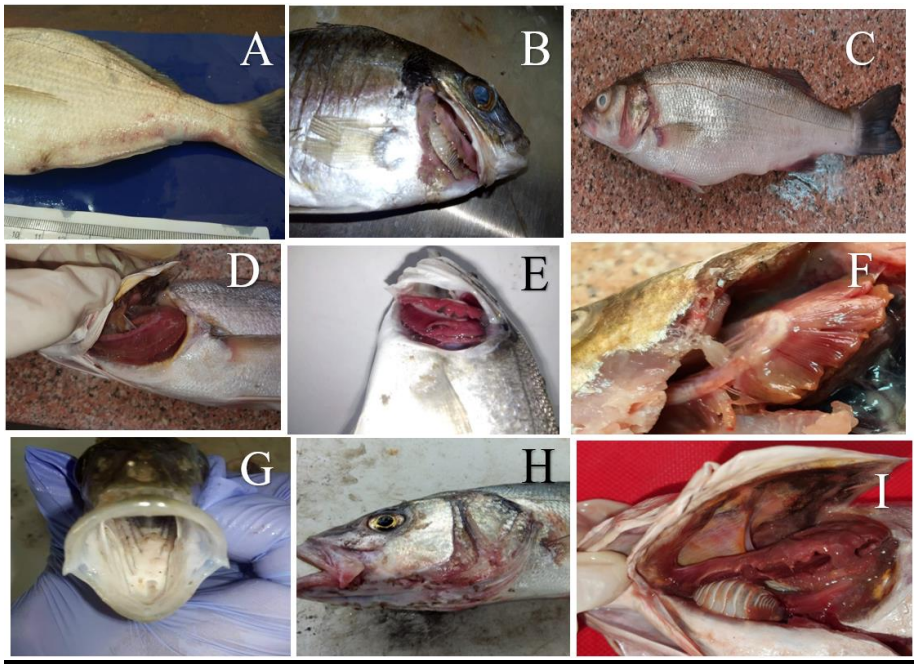

Figure (1): Photographs of *S. aurata* showing **A.** hemorrhagic areas at caudal fin and abdomen, **B.** isopod attached to the gill arch with excessive mucus and marbling appearance**;** *D. labrax* showing **C.** hemorrhagic areas on gill cover, pectoral, pelvic and anal fins, **D.** excessive mucus secretion in gills, **E.** Marbling appearance with attachment of Lernanthropus sp. **F.** Sloughed gill filaments; **G.** heavy infestation with Caligus sp. which attached to the tongue and mouth cavity**; H.** Heavy infestation with Caligus sp. on head and isthmus with hemorrhagic areas; *A. regius* showing **I.** attachment of isopod to gills with excessive mucus secretion.

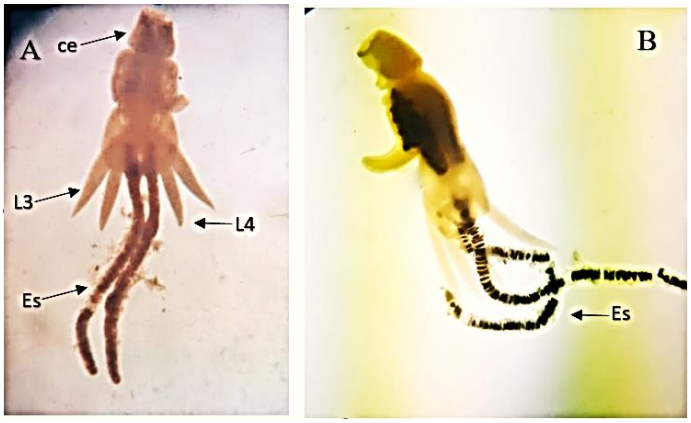

Figure (2): Photomicrographs of *Lernanthropus kroyeri* **A.** a whole female, **B.** lateral view of a female. **ce**. Cephalothorax, **L3.** 3rd pairs of leg, **L4.** 4th pair of leg, **Es.** The egg sac.

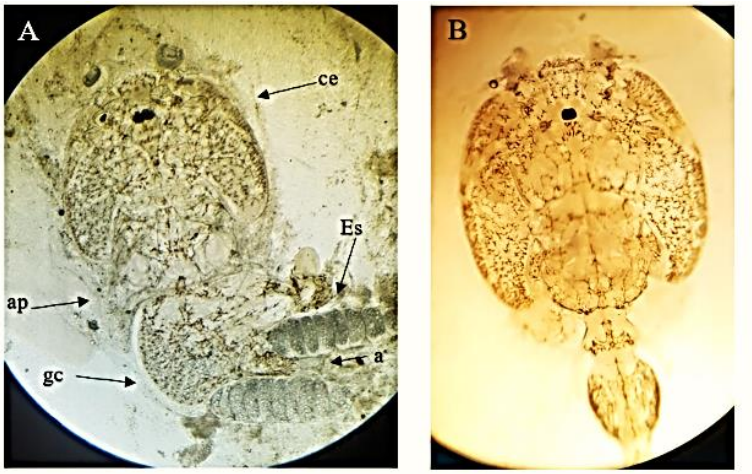

Figure (3): Light photomicrographs of *Caligus minimus* A. a whole female, **B.** a whole male. **ce**: cephalothorax, **ap**: apron, **gc**: genital complex, **a**: abdomen, **Es**: egg sac.

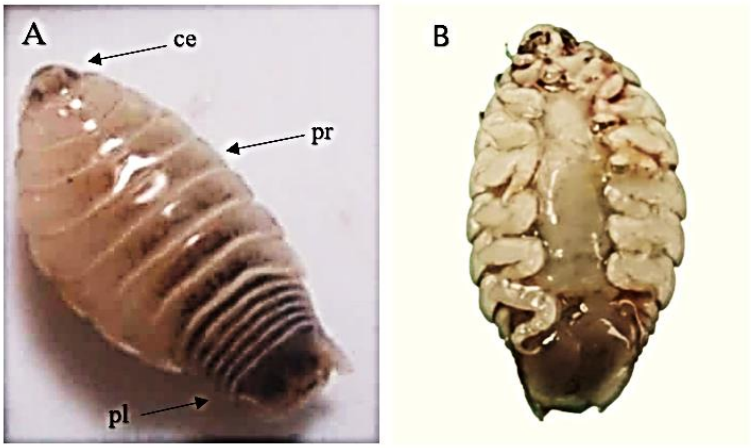

Figure (4): A photograph of *L. redmanii* **A.** dorsal view, **B.** ventral view, **ce**: cephalon, **pr**: pereon, **pl**: pleon.

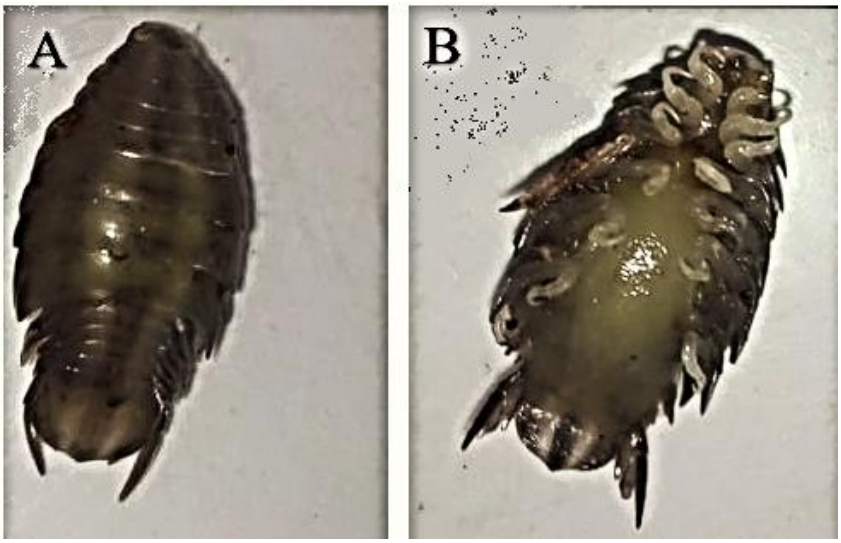

Figure (5): A photograph of *Nerocila orbignyi* **A.** dorsal view **B.** ventral view.

Table (1): Total crustacean infestation among the examined fish.

Fish species	Crustacean infestation
***D. labrax* N= 68**	37 (54.4%)
***S. aurata* N= 68**	5 (7.4%)
***A. regius* N=68**	3 (4.4%)
Total N=204	45 (22.1%)

N= Number of examined fish

Table (2): Prevalence of different crustacean infestations among the examined fish.

nfestation / Fish species	*Caligus minimus*	*Lernanthropus kroyeri*	*Livoneca redmanii*	*Nerocila orbignyi*
***D. labrax* N= 68**	19 (27.9%)	18(26.5%)	0(0%)	0(0%)
***S. aurata* N= 68**	0(0%)	0(0%)	0(0%)	5(7.4%)
***A. regius* N=68**	0(0%)	0(0%)	3(4.4%)	0(0%)
Total N=204	19(9.3%)	18 (8.8%)	3(1.5%)	5(2.5%)

N=No. of examined fish

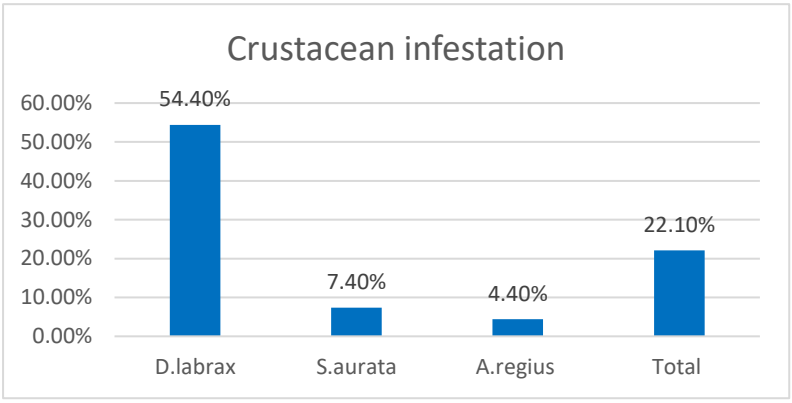

Figure (6): Total crustacean infestation among examined fishes.

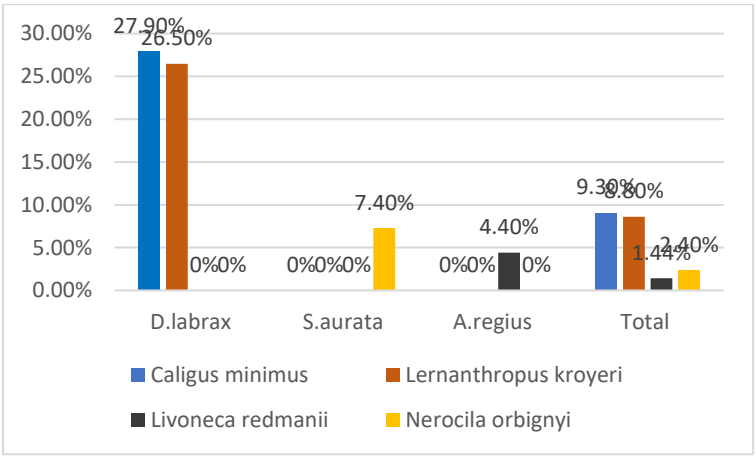

Figure (7): Prevalence of different crustacean infestations among the examined fish.

Discussion:

This study aimed to determine the prevailing crustacean diseases among (*D. labrax, S. aurata and A. regius)* which considered the most important marine species in Egyptian aquaculture sector and their effect on fish health. Some fishes were aggregated near water inlets with gasping, others were rubbing against pond boundaries with excessive mucous secretion. The infested fishes showed hemorrhagic areas at different parts of the body. It may be due to irritation caused by movement, feeding habits and attachment of crustaceans by their claws while excessive mucous may act as a defense mechanism against infestation. These findings are stated also by ***Abdel-Mawla and El-Ekiaby (2012); Khalil et al. (2014); Qurany (2020) and Omar (2022)***.

Infested *S. aurata* gills with isopods showed excessive mucous secretion and/or marbling appearance. Marbling appearance maybe due to blocking of blood vessels due to crustacean attachment and the mucous secretion may be increase to dilute the irritation and to help in defense response**.** ***El-lamie (2007); NoorEl-Deen et al. (2013) and Hassanin (2016)*** also agree with these results.

Infested *D. labrax* with *Caligus minimus* showed attachment of the parasite to mouth, head, gill operculum and isthmus part. The same sites of attachment were described by ***Price et al. (2011), Noor El-Deen et al.(2013); Akif and Kayis (2015); Helna et al. (2018) and Omar (2022).***

D. labrax with *Lernanthropus kroyeri* infestation revealed black lines between gill filaments. ***Yardimci and Pekmezci (2012); El-Raziky (2016) and Omar (2022)*** found similar results. These black lines maybe due to the parasite`s dark egg sac.

Infested *A. regius* with gill isopods showed bulging of operculum with excessive mucous secretion. These findings are compatible with ***El-Lamie and Abdel-Mawla (2015), Gaafar (2015), El-Shafey (2016), Helal and Yousef (2018), Qurany (2020) and Omar (2022).***

Concerning parasitological examination, the copepod *Lernanthropus kroyeri* was isolated from gills of *D.labrax*. This result agrees with ***Manera and Dezfuli (2003), Abu Samak (2004), Abu Samak and Ashraf (2008), Eissa et al. (2012) and El-Raziky (2016).*** The morphological characteristics was agreed with ***Lugue and Paraguass (2003) Manera and Dezfuli (2003), Alas et al. (2008), Simonetta and Vivcenza (2010), Eissa et al. (2012) and El-Raziky (2016).***

Regarding *Caligus minimus* morphology, it agrees with the results recorded by ***Paperna (1980).*** This parasite was isolated from inside the mouth, head and isthmus part of *D. labrax*. ***Paperna (1980), Sterud (2002), Ragias et al. (2004), Noor El-Deen et al. (2013), Akif and Kayis (2015) and Qurany (2020)*** also isolate *C. minimus* from *D. labrax.*

Concerning isopods infestation, *A. regius* was infested with *Livoneca redmanii* attached to gill filaments. This agrees with **Fadel *et al.* (2020)**. It`s morphology agrees with ***Brusca (1981), EL-Zoghby (2020) and Qurany (2020).*** Also, *Nerocila orbignyi* isopods were isolated from gills of *S. aurata*. This disagrees with ***Qurany (2020)*** as she isolated it from gills of *D. labrax*. But it`s morphologically agrees with her and with ***Khattab (2016) and Öktener and Trilles (2021).***

Concerning the total prevalence of crustacean infestation among the examined fishes, it was 22.10% which is lower than that of ***Omar (2022)*** which was 39.37% but higher than that of ***Adel (2017)*** which was 21%. As well as it was 54.4 %, 7.4%

and 4.4 % in *D. labrax, S. aurata and A. regius* respectively. The result of *D. labrax* is higher than that of ***Hassanin (2016)*** which was 48.57% in *D. labrax* and lower than that obtained by ***Elzoghby (2020)*** which was 62.91% in *D. labrax*.

In this study, the total prevalence of *Caligus minimus* among examined fishes was 9.30%. This result is lower than that of ***Elzoghby (2020), Qurany (2020) and Omar (2022)*** which was 33.47%, 10.14% and 27.8% respectively and higher than that of ***Abdel-Mawla et al. (2015)*** which was 5%. These differences may be due to different locations and different examined species. The prevalence among *D. labrax* was 27.9%. This result is higher than ***Elzoghby (2020)*** as it was 24.16 % and ***Omar (2022)*** which was 23.75% and lower than that of ***Akif and Kayis (2015)*** who found it as 94%.

Regarding the *Lernanthropus kroyeri*, the total prevalence of infestation was 8.80%, this result is higher than that of ***Elzoghby (2020)*** as it was 4.16% and lower than ***Abou Zaid et al. (2018)*** which was 18% and ***Qurany (2020)*** that it was 43.36%, this difference maybe because of different locations of the collected fishes. On the other hand, *Lernanthropus kroyeri* prevalence among *D. labrax* was 26.5%. This result is higher than ***Elzoghby (2020)*** as it was 12.5% and lower than ***Omar (2022)*** which was 31.25% in *D. labrax.*

The recorded total prevalence of isopod *Livoneca redmanii* was 1.5% which is nearly agree with ***Omar (2022)*** as it was 1.44% but lower than that of ***Elzoghby (2020)*** as it was 5.13%. These differences may be due to human interference and hygienic measurement at aquaculture. The prevalence among *A. regius* was 4.4%. This finding was lower than that of ***Fadel et al. (2020)*** which was 77.05 and ***Ali et al. (2022)*** which was 33%. On the other hand, *Nerocila orbignyi* prevalence among the examined *S. aurata* was 7.4 % which is lower than that obtained by ***Mahmoud et al. (2017a)*** which was (36.7%). These differences may come from different locations from where samples were obtained.

References:

Abdel-Mawla H.I. and El-Ekiaby (2012): Some studies on parasitic infection among *Morone labrax* (Seabass fish) as bio-indicator of environmental conditions. Egyptian Journal for Aquaculture Vol. 2 No.3.

Abdel-Mawla H.I., El-Lamie M.M.M and Dessouki A.A.A (2015): Investigation on ectoparasitic crustacean diseases in some Red sea fishes and their associated pathological lesions. Benha Veterinary Medical Journal, Vol. 28, NO. 1: 301-309.

Abou Zaid, A. A., Bazh, E. K., Desouky, A. Y., & Abo-Rawash, A. A. (2018). Metazoan parasite fauna of wild sea bass; *Dicentrarchus labrax* (Linnaeus,

1758) in Egypt. *Life Science Journal*, *15*(6).

Abu Samak, O. (2004): Predescription of *Lernanthropus kroyeri* (Copepoda: Lernanthropidae) infesting gills of the Seabass fish *Dicentrarchus labrax* Mediterranean waters J. Egypt. Ger. Soc. Zool, (43): 87-103.

Abu Samak, O. and Ashraf, E. S. (2008): Population dynamics of the monogeneans, *Diplectanum aequans* and *D. laubieri* and the copepod *Lernanthropus kroyeri* infesting the gills of the sea bass, *Dicentrarchus labrax* in Egypt. Research Gate.

Adel, M.R. (2017): Studies on the Prevailing Parasitic Diseases in Some Marine Fishes, Master. D. Thesis, Fish Farming and Technology Institute, Suez Canal Univ.

Akif, E. R. and Kayis, S. (2015): Intensity and prevalence of some crustacean fish parasites in Turkey and their molecular identification. Turkish Journal of Zoology. 39: 1142-1150.

Alas, A.; Oktener, A.; Iscimen A. and Trikkes J. P. (2008): New host record, *Parablennius sanguinolentus* (Teleostei, Perciformes, Blenniidae), for *Nerocila bivittate* (Crustacea, Isopoda, Cymothoidae). Parasitology Research. (102):645-646.

Ali, N. G., Ali, T. E. S., Kamel, M. F., Saleh, R., Sherif, A. H., and Aboyadak, I. M. (2022): Eradication of *Livoneca redmanii* infestation in cultured *Argyrosomus regius*. *Aquaculture*, *558*, 738373.

Amlacker, C. (1970): Textbook of fish diseases. T. F. H. Publ. Neptune City, New Jersey. 117-135.

Bayoumy, E. and Baghdadi, H. (2013). New record of parasitic Praniza Larva of *Gnathia pantherina*; Smit and Basson, 2002; from Arabian Gulf Greasy Grouper *Epinephelus tauvina* caught from Saudi Coastal Water of Dammam. Global Veterinaria 11(4):414-419.

Brusca, R. C. (1981): A monograph on the Isopoda Cymothoidae (Crustacea) of the eastern Pacific. Zoological Journal of the Linnean Society, 73, 117–199.

Duncan, N. J., Estévez, A., Fernández-Palacios, H., Gairin, I., Hernández-Cruz, C. M., Roo, J., and Vallés, R. (2013). Aquaculture production of meagre (Arg*yrosomus regius*): hatchery techniques, on growing and market. In *Advances in aquaculture hatchery technology* (pp. 519-541). Woodhead Publishing.

Eiras, J.; Pavanelli, G. and Takemoto, R. (2000). Doencas de Peixes. Profilaxia, diagno sticoe tratamento. Parana: Editorada Universidad Estadual de Maringa; Portuguese P. 264.

Eissa, I. A. M.; El-Lamie.M. M. M. and Zaki M.(2012): Studies on Crustacean Diseases of Seabass, *Morone Labrax*, in Suez Canal, Ismailia Governorate (Dept. od Fish Diseases & Management Fac. Of Vet Med., Suez Canal Univ.) Life Science Journal, 9(3): 515.

El-Lamie M. (2007). Studies on the parasitic diseases in some marine

fish. Ph.D. Thesis Fac. Of Vet. Med. Dep. Suez Canal University. PP. 188.

El-Lamie M.M.M. and Abdel-Mawla H.I (2015): Isopod infestation in relation to vibriosis of some marine fishes. Egy. J. Aquac, 5(2), 13-26.

El-Raziky E. A. (2016): Studies on the prevailing external parasitic diseases in marine fishes. Ph. D. Thesis, Fac. Od Vet. Med. (Dept. of Fish Diseases and Management), Suez Canal Univ.

El-Raziky E. A. (2016): Studies on the prevailing external parasitic diseases in marine fishes. Ph. D. Thesis, Fac. Od Vet. Med. (Dept. of Fish Diseases and Management), Suez Canal Univ.

El-Shafey, S. (2016): Studies on parasitic diseases among some marine fish with reference to multifactorial causes in Port-Said governorate. MVS. Thesis, Fac. Of Vet. Med. (Dept. of Fish Diseases and Management), Suez Canal Univ

EL-Zoghby, M. (2020): Ammonia Toxicity in Relation to Some Marine Fish Disease Occurrence., Master, D. Thesis, Fish Farming and Technology Institute, Suez Canal Univ.

Fadel, A., Bessat, M., and Abdel-Aziz, M. (2020). *Livoneca redmanii* (Isopoda, Cymothoidae) in meagre *Argyrosomus regius*: parasitological and molecular diagnosis and proposed control measure. Diseases of Aquatic Organisms, 140, 13- 24.

FAO (2013). Fisheries and Aquaculture Department. In: FAO Fishers and Aquaculture Department [online]. Italy.

Feidi, I. (2018). Will the new large-scale aquaculture projects make Egypt self-sufficient in fish supplies?. *Mediterranean Fisheries and Aquaculture Research*, *1*(1), 31-41.

Gaafar,R. I. A. (2015): Studies on diseases caused by Isopods in some marine fishes at Suez Canal area. MVC. Thesis, Fac. Of Vet. Med. (Dept. of Fish Diseases and management), Suez Canal Univ.

GAFRD (2014): General authority for fish resources development. In: Fish Statistics Year Book. Cairo, Egypt: Ministry of Agriculture and Land Reclamation.

Grigorakis, K., Alexis, M. N., Taylor, K. A., & Hole, M. (2002). Comparison of wild and cultured gilthead sea bream (*Sparus aurata*); composition, appearance and seasonal variations..

Haldén, A. N., Lindberg, J. E., & Masembe, C. (2014). Aquaculture a fast growing food production sector. *SLU Glob*, *4*(1), 42-45.

Hassanin, D.A. (2016): Studies on prevailing problems affecting cultured marine fishes at port-Said governorate. MVS. Thesis, Fac. Of Vet. Med. (Dept. of Fish Diseases and management), Suez Canal Univ.

Hassanin, D.A. (2016): Studies on prevailing problems affecting cultured marine fishes at port-Said governorate. MVS. Thesis, Fac. Of Vet. Med. (Dept. of Fish Diseases and management), Suez Canal Univ.

Helal, A. M., and Yousef, O. E. (2018): Infestation Study of *Livoneca redmanii* (Isopoda, Cymothoidae) on *Mugil cephalus* in Lake Qarun, Egypt. Egyptian Academic Journal of Biological Sciences, B. Zoology, 10(1), 1- 17.

Helna, A. K.; Sudha, K.; Aneesh, P. T. and Anilkumar, G. (2018): *Caligus cybii* (Caligidae, Copepoda) Parasitising the Commercially Exploited Seer Fish, *Scomberomorus commerson*, from the Malabar Coast (India)- Occurrence and Adaptations. Turkish Journal of Fisheries and Aquatic Sciences 18: 445-455.

Khalil, R. H.; Saad. T. T. and Abd El-Hamid, T. M. (2014): Some studies on parasitic Infestations in some Marine water fish with Special Reference on Isopoda. J. Arab. Aq. Soc, 9(1):75-87.

Khattab, M. S. (2016): Parasitic Cymothoid Isopods and their Impacts in Commercially Important Fishes From Lake Qarun, Egypt. International Journal of ChemTech Research CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online): 2455-9555 Vol.9, No.12 pp 221-229.

Lucky, Z. (1977): Methods for the diagnosis of fish diseases American Publishing Co., Pvt. Ltd., New Delhi, Bombay Calcutta and New York.

Lugue, J. L. and Paraguassu, A. R. (2003): Redescriptions of two species of Lernanthropus [Copepoda, Siphonostomatoida, Lernanthropidae] parasitic on teleost marine fishes from Rio de Janeiro, Brazil. Acta Parasitologica, 48(2) : 119-124.

Mahmoud N. E., Fahmy M. M. and Abuowarda M. (2017a): An Investigation of Cymothoid Isopod Invasion in Lake Qarun Fishes with Preliminary Trial for Biological Control. International Journal of Chem Tech Research, 7,10(2): 409-416.

Manera, M. and Dezfuli, B. (2003). *Lernanthropus kroyeri* infections in farmed sea bass *Dicentrarchus labrax*: pathological features. Dis. Aquat. Organ. 3. 57(1-2): 177-180.

Noor El- Deen, A.I.E., Mahmoud, A.E. and Hassan,' A.H.M. (2013): Field studies of Caligus parasitic infections among cultured sea bass *(Dicentrarchus labrax*) and mullet (*Mugil cephalus*) in marine fish farms with emphasis on treatment trials. Global Veterinaria; 11 (5): 511-520. 43.

Noor El- Deen, A.I.E., Mahmoud, A.E. and Hassan,' A.H.M. (2013): Field studies of Caligus parasitic infections among cultured sea bass *(Dicentrarchus labrax*) and mullet (*Mugil cephalus*) in marine fish farms with emphasis on treatment trials. Global Veterinaria; 11 (5): 511-520. 43.

Öktener, A. and Trilles, J. P. (2021). Host Selectivity of *Nerocila Orbignyi* (Guerin-Meneville, 1832) (Isopoda, Cymothoidae) with a Record of a New Host from the Sea of Marmara (Turkey). Transylvanian Review of Systematical & Ecological Research, 23(1), 37–58.

Omar, H. E. M (2022): Studies on some Prevalent Parasitic Diseases Among Some Marine Fishes in

Timsah Lake. MVS. Thesis, Fac. Of Vet. Med. (Dept. of Fish Diseases and Management), Suez Canal Univ

Osman, H.; Hassan, M. and El-Refaey, A. (2014). Studies on *Sarcotaces spp*. (Copepoda: Philichthyidae) infestation (Black Bag Diseases) among some marine fish species of Arabian Gulf, Saudi Arabia. World Applied Sciences J. 32(29): 1780-1788.

Paperna (1980): Study of *Caligus minimus* (Otto, 1821), (Caligidae. Copepoda) infections of the seabass (*Dicentrarchus labrax* L.) in Bardawil lagoon. Annals of Parasitology 55. 687-706.

Price, M. H. H.; Proboszez, S. L.; Routledge, R. D.; Gottesfeld, A. S.; Orr, C. and Reynolds, J. (2011): Sea louse infection of juvenile sockeye salmon in relation to marine salmon farms on canada's west coast. PLOS ONE, 6(2): 1-9 .

Qurany, R. A. (2020): Molecular Studies on Diagnosis of Some Parasitic Diseases in Seabream and Seabass fishes. Ph.D. Thesis, Fac. Vet. Med. (Dept. of Fish Diseases and management), Suez Canal Univ.

Ragias, V.; Tonis, D. and Athanassopoulou, F. (2004): Incidence of an intense *Caligus minimus* Otto 1821, *C. pageti* Russel, 1925, *C. mugilis* Brian, 1935 and *C. apodus* Brian, 1924 infection in lagoon cultured sea bass (*Dicentrarchus labrax* L.) in Greece. Aquaculture, (242): 727-733.

Simonetta, C. and Vincenza, F. (2010): Parasites of wild Seabass Dicentrarchus labrax (Linnaeus 1758) from St. Gilla Lagoon (Sardinia, South Western Mediterranean), (7): 123-133.

Soliman, N. and Yacout, D. (2016). Aquaculture in Egypt: status, constraints and potentials. Aquaculture International. 24:5.

Sterud, E. (2002): Parasites of wild seabass *Dicentrarchus labrax* from Norway. Diseases of aquatic organisms Vol. 48: 209–212.

Yardimci B. and Pekmezci G. Z. (2012): Gill histopathology in cultured sea bass (*Dicentrarchus labrax* L.) coinfected by *Diplectanum aequans* (Wagener, 1857) and *Lernanthropus kroyeri* (van Beneden, 1851). Ankara Univ. Vet Fak Derg, 59, 61-64.

الملخص العربي

تعتبر الأسماك مصدرًا هاماً للبروتين بالنسبة للإنسان ، وخاصة الأسماك البحرية. يعتبر الاستزراع المائي قطاعًا مهمًا في العالم. لذا أجريت هذه الدراسة على 204 سمكة من 3 أنواع من الأسماك البحرية المستزرعة وهي "68 من أسماك القاروص و 68 من أسماك الدنيس و 68 من أسماك اللوت" بأوزان وأطوال مختلفة تم جمعها في مواسم مختلفة من 4 مزارع سمكية خاصة في منطقة قناة السويس ومحافظة دمياط لدراسة الأمراض الطفيلية السائدة التي تصيب هذه الأنواع من الأسماك خلال المواسم المختلفة على مدار عام.

و تم تلخيص النتائج كالآتي :

1. أظهر الفحص الاكلينيكي عدم وجود علامات مرضية على الأسماك المصابة بالطفيليات المختلفة.بعض الأسماك كانت تتجمع عند مداخل المياه في الحوض مع اللهاث والبعض الأخر كان يحك اجسامه في جوانت الحوض مع افراز مفرط للمخاط على جسم الأسماك. أظهرت بعض الأسماك المصابة مناطق نزفية حول الفم والرأس وسطح الجسم والذيل والبطن مع تآكل في الزعنفة الذيلية. ظهر البعض الآخر هزيلا مع انتفاخ في البطن ، وإفراز مخاطي مفرط في حالة التصاق القشريات . ظهرت بعض أسماك الدنيس المصابة بمظهر مخملي لسطح الجسم والخياشيم. و ظهر ببعض أسماك اللوت بقع بيضاء مبعثرة على سطح جسم الأسماك المصابة.

2. بالفحص التشريحي بعد نفوق الأسماك ظهر أن بعض الأسماك المصابة تعاني من خياشيم شاحبة وخياشيم رخامية مع ظهور تآكل في أجزاء من الخياشيم. أظهرت بعض أسماك القاروص كبدًا شاحبًا وأظهر البعض الآخر التصاق الليرنانثروبس كرويري بالخياشيم التي ظهرت كخطوط سوداء بين خيوط الخياشيم. وأظهر بعض من أسماك الدنيس واللوت الأخرى التصاق الأيزوبودا بالخياشيم.أظهرت أسماك الدنيس المصابة شحوب الكبد ، واحتقان الأوعية الدموية المعوية ، والتهاب المعدة والأمعاء ووجود يرقات الديدان داخل تجويف الجسم. وكشف بعض أسماك اللوت المصابةعن احتقان في الطحال.

3. تم تصنيف الطفيليات المعزولة إلى: الليرنانثروبس كرويري من خياشيم أسماك القاروص، كاليجاس مينيماس (قمل الأسماك) من داخل الفم و منطقة الرأس والجسم لأسماك القاروص، أيزوبودا ليفونيكا ريدماناي من خياشيم أسماك اللوت، أيزوبودا نيروسيلا اوربيجناي من خياشيم سمكة الدنيس .

4. بلغ معدل انتشار الإصابة الطفيلية الكلي 22.1٪ ، وكانت أعلى نسبة إصابة في أسماك القاروص بنسبة 54.4٪ ثم أسماك الدنيس بنسبة 7.4٪ وأقلها في أسماك اللوت بنسبة 4.4٪