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FEEDING HABITS OF THE OF THE THIN LIP GREY MULLET LIZA RAMADA (RISSO, 1826) IN AIN EL-GHAZALA LAGOON–EASTERN LIBYA

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Abstract: The feeding habits of 500 specimens of *Liza ramada* (family: Mugilidae), inhabiting Ain El_Ghazala lagoon, were studied monthly from January to December 2013. The annual diet composition, monthly variations in the diet composition, the variations of diet with length and the intensity of feeding were studied. *Liza ramada* feed on a wide variety of prey types: Diatoms (41.3%), Polychaetes (18.8%), Green algae (16.8 %), Crustacea (11.0%), Foraminifera (3.5%) and Sediments (8.7%). The Diatoms, Polychaetes, Green algae and Crustacea, were the major food item all year round and it was found in all length groups. In the present study Diatoms, Green algae and Sediments increased as the size increased while Polychaetes, Crustacea and Foraminifera decreased as the fish size increased. The feeding intensity was quite high during the winter and autumn.

Key Words: Feeding habits, *Liza ramada*, eastern coast, Mediterranean Sea, eastern Libya

INTRODUCTION

The thin-lipped grey mullet *Liza ramada* (Risso, 1826) is a catadromous pelagic species. *L. ramada* is common in the shallow waters of the eastern Mediterranean and Black sea (El-Mor, 1993). This species lives in brackish and marine waters which corresponds to lagoons, estuaries and rivers deltas (Jardas, 1996). It tolerates salinity extremes as well as important variations of the water quality (Thomson, 1990). Like most Mugilids, this species reproduces at sea, after which fry undertake a trophic migration shoreward to continue their development (El-Mor, 1993; Koutrakis *et al*., 1994) in food rich lagoons, rivers and even lakes (Thomson, 1966). Few authors have studied the reproductive biology of *L. ramada* (El-Maghrby *et al*., 1974; Mohammad, 1982; El-Mor, 1993; Bartulovič *et al*., 2007; El-Halfawy *et al*., 2007). Despite the importance of mugilids, little is known about its biology (Ekwella, 2008). Therefore the aim of the present work is to investigate for the first time the feeding habits of *L. ramada* in Ain El-Ghazala lagoon, eastern Libya in the south Mediterranean sea.

Liza ramada position in the trophic structure of the Libyan eastern coast is poorly understood. So the aim of the present study is defining the trophic relationships between the thin lip grey mullet with other invertebrates and plants in this area, in order to understand the dynamic of this regional ecosystem. Beside results from feeding habits of the thin lip grey mullet may have direct implications for aquaculture.

MATERIALS AND METHODS

Monthly samples of *Liza ramada* were collected during the period from January to December 2013 by using gill and trammel nets from artisanal fishing in Ain El-Ghazala lagoon (32º 10` 26" N – 23º 18` 37" E) on the Mediterranean (Fig. 1). A total of 500 specimens of *Liza ramada* were sampled for studying the feeding habits. Feeding Habits of the thin lip grey mullet, *L. ramada* (Risso, 1826) from Ain El-Ghazala lagoon, eastern Libya. Annual, diet composition, seasonal variations of diet, variations of diet with lengths and feeding intensity were estimated in this study. For each fish specimen total length measured to the nearest 0.1 cm. Each fish was dissected and the alimentary tract removed and preserved in formalin. The degree of fullness of the stomach was assessed by visual estimation and classified as empty, trace, quarter full, half full, three quarters full and completely full respectively as described in Pillay (1952). Food items were identified to their groups. A list of general diet composition was made food analysis was made by points of assessment (Hyslop, 1980; Hynes, 1985). The results were give more precise information about food and feeding habits of *Liza ramada*.

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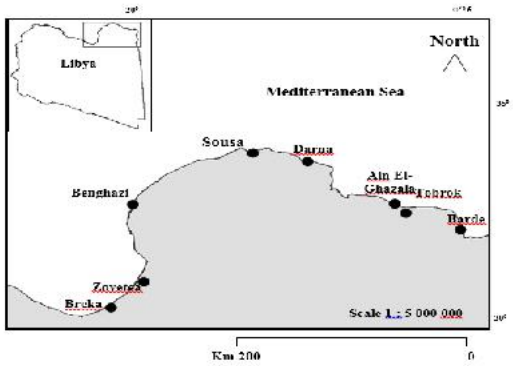

Fig.1: Ain El-Ghazala lagoon, on the Mediterranean, Libya

RESULTS

Annual Diet Composition

The variety of food item was large. However the diet composition of *Liza ramada* in Ain El-Ghazala lagoon during the period from January till December 2013 composed of diatoms, polychaetes and green algae which formed the major food group for *Liza ramada* (Fig. 2).

Diatoms made up of 41.3% by volume composition of the bulk of the diet which represent by 6 genera, Pleurosigma, Navicula, Synedra, Nitzchia, Amphora and Cyclottella, whereas polychaetes (18.8%) coming in the second rank of importance. A green algae constituting 16.8% were composed of Codium, Chladophora and Cheitomorpha, this following by crustacean copepods (11.0%), foraminifera (3.5%), and considerable quantities of sediments (Sand and clay) constituting 8.7%.

Monthly variation in diet composition

The food items diatoms, polychaetes, green algae and crustacean were occurred in all year round and constituted the major food items during the study (Table 1).

Foraminifera and sediments were completely disappeared in November and December.

Table (2) showed seasonally variations in diet composition for 500 specimens of *Liza ramada* in Ain El-Ghazala lagoon during the study period, the fish preferred diatoms in summer (42.5%) and autumn (50.9%). Where Polychaetes were taken by 22.5% in winter and by 22.6% in spring.

In winter, green algae ingested by 19.0% where cruastacea recorded (13.1%). In summer the fish take foraminifera (6.0%) and sediments (10.8%).

Feeding habit in relation to fish size

The total length of *Liza ramada* population classified into 11 classes ranged from 12.5cm to 34.4 cm with 1.9 cm interval (Table 3). Prey size differed between large size individuals, which had ingested the large size prey, whereas the small sized fish ingested the small size prey. Diatoms, polychaetes, green algae, and crustacea were found in all length groups of *L. ramada*.

Green algae and Sediments increased as the size increased while Polychaetes, Crustacea and Foraminifera decreased as the fish size increased.

Diatoms were found in all length groups *L. ramada*, they increased from 32.4% in size class (12.5-14.4 cm) to 58.9% in size class (32.5-34.4cm). Polychaetes decreased from 38.1% in size class (12.5-14.4cm) to 0.7% in size class (32.5-34.4cm), green algae increased from 1.1% in size class (12.5- 14.4cm) to 34.7% in size class (32.5-34.4cm). Crustaceans ingested in size class (12.5-14.4cm) by 19.1% decreased in the following length groups and recorded the lowest value 5.7% in size class (32.5-34.4cm). Foraminifera decreased from 8.8% in size class (12.5-14.4cm) to 0.3% in size class (24.5-26.4cm), then disappeared in the following length groups. Sediments were taken by 0.6% in small fish (12.5-14.4cm), then increased to 13.2% in size class (30.5-32.4cm), then disappeared in large fishes (32.5-34.4cm).

Feeding intensity

Fishes with stomach half full, almost full and full of food ranked b% constituted 57.2% of all analyzed individual, whereas those with stomach that were empty or with traces of food and quarter full ranked a% represented 42.8% of the total specimens (Table 4).

The feeding activities were quite high during autumn (66.8%) and winter (81.1%). There are minimal rate of feeding intensity recorded in spring (38.0%) and summer (42.8%).

DISCUSSION

The food and feeding habits of mullet fishes have been studied by many authors (Farrugio and Quignard, 1973; Blaber & Whitefield, 1977; Brusle, 1981; Mohammad, 1982; Wijyeretne and Costa, 1986; El-Mor, 1993; Almeida, 2003 and Rasheed, 2012).

The thin lip gray mullet *Liza ramada* found over rock rubble or sand bottoms, young frequently found on algae, sea grasses beds and continual shelf (El-Mor, 1993), feeds on diatoms, polychaetes, crustaceans, algae, molluscs and sediments (Mohammad, 1982).

In the current study *L. ramada* were found to consume a wide range of food items ranging from diatoms supplemented by polychaetes, green algae, crustaceans, foraminifera and sediments formed the major food group for the target species this is full agreement with Mohammad (1982) and El-Mor (1993). Also, the present results were similar to that of Farrugio and Quignard (1973) who studied the feeding biology for the *L. ramada* in Tunis Mediterranean Sea and found that the species feed on diatoms, crustacean, polychaetes, foraminifera, green algae with fragment quantities of sediments.

In the present work, the fish preferred diatoms in summer (42.5%) and autumn (50.9%). Where Polychaetes were taken by 22.5% in winter and by 22.6% in spring.

In winter, green algae ingested by 19.0% where cruastacea recorded (13.1%). In summer the fish take foraminifera (6.0%) and sediments (10.8%), this is full agreement with Brusle (1981).

Generally, the food extent demands and ability for food acquisition increase with fish development (Honda, 1984).

Blaber and Whitefield, (1977) studied the feeding habits of *Liza ramada* and they concluded that the numbers and size prey taxa increased with size of the thin lip grey mullet due to the ability of larger fishes to consume a wide range of prey sizes than smaller fishes, this phenomenon appeared to be done for the target species in present work. Also, the attained results showed that diatoms, green algae and sediments increased as the fish size increased while, polychaetes, crustaceans and foraminifers decreased as the fish size increased, which is in agreement with El-Mor (1993).

The monthly variation in the condition factors fish is affected by the feeding activity which may show their reflection on the body condition (Andreu-Soler, *et al*., 2006), this phenomenon appears to be correct for species in the present work. The highest condition factor values (K_f and K_c) were recorded in autumn and winter (El-Mor, 1993), these results coincide with the degree of stomach fullness in autumn and winter due to food availability. This supports observations for the target species in Tunis Mediterranean Sea (Farrugio and Quignard, 1973), in the Egyptian Mediterranean waters (El-Emary, 1987), in Suez Canal, Egypt (El-Mor, 1993) and coastal waters of Sousa coast, Libya for *Mugil cephalus* (Rasheed, 2012).

REFERENCES

1. Almeida PR, 2003. Feeding ecology of *Liza ramada* (Risso, 1810) (Pisces, Mugilidae) in a south-western estuary of Portugal. Estuar. Coast. Shelf Sci. 57:313-323.
2. Andreu-Soler AFJ, Oliva-Paterna and M Torralva, 2006. A review of length-weight relationships of fish from the Segura River basin (SE Iberian Peninsula). J. Appl. Ichthyol. 22:295-296.
3. Bartulovič V, Giamuzina B, Lucic D, Conides A, Jasprica N and Dulčič J 2007. Recruitment and food composition of juvenile thin-lipped grey mullet, Liza ramada (Risso, 1826), in the Neretva River estuary (Eastern Adriatic, Croatia). Acta Adriat, 48, 25-37.
4. Blaber SJM and Whitfield AK, 1977. The feeding ecology of juvenile mullet (Mugilidae) in South East Africa estuaries. Biol. J. Linn. Soc., 9: 277-284.
5. Brusle J, 1981. Food and feeding in grey mullets. In O.H. Oren (Ed.), Aquaculture of grey mullets. Cambridge University. Press. pp. 185-217.
6. El-Emary HT, 1987. Some biological studies on *Dicentrachus labrax* (Family: Serranidae) in the Eastern Mediterranean waters near Alexandria. M.Sc. Thesis, Fac. Sci., Alex. Univ., 167 p.
7. El-Maghrby AM, Hashem MT & El Sedfy MM 1974. Sexual maturity spawning, migration and fecundity of *Mugil capito* in Lake Borullus. Bull. Inst. Oceanogr. Fish, 4, 35-56.
8. Ekwelha SA, 2008. Environmental and biological studies on juvenile commercial fishes in EL- Hamamh coast (EL-Gabal EL- Akadar), Libya.
9. El-Halfawy MM, Ramadan AM & Mahmoud WF, 2007. Reproductive Biology and Histological Studies of the Grey Mullet, *Liza ramada*. (Risso, 1826) in Lake Timsah, Suez Canal. Egyptian Journal of Aquatic Research, 33, 434-454.
10. El-Mor M (1993). Fisheries and biological studies on some fish species of family Mugilidae inhabiting the Suez Canal. M.Sc. Thesis, Marine Sci. Dep. Fac. of Sci. Suez Canal Uni. 94 pp.
11. Farrugio H and JP Quignard, 1973. Biologie de Mugil (*Liza*) *ramada* Risso, 1826 et de Mugil (*Chelon*) *labrosus* Risso, 1826 (Poissons, Teleosteens, Mugilides) du lac de Tunis. Taille de premiere maturite sexuelle, cycle et fecondite. Bulletin de l'Institut National Scientifique et Technique d'Oceanographie et de Peche de Salammbo 2(4):565-578.
12. Huslop EJ, 1980. Stomach content analysis. A review of methods and their application. J. fish. Biol. 17: 411 – 429.
13. Hynes HBN, 1985. The food of freshwater sticklebacks' (*Grasteroteus aculeatus* and *Fygosteu pungitius*) with a

review methods used in studies of the food of fishes. J. Anim. Ecol. 19: 36-56.

14. Jardas I 1996. Jadranska ihtiofauna. Školska knjiga, Zagreb, 553 pp.

15. Koutrakis ET, Sinis AI & Economidis PS, 1994. Seasonal occurrence, abundance and size distribution of grey mullet fry (Pisces, Mugilidae) in the Porto-Lagos Lagoon and Lake Vistonis (Aegean Sea, Greece). The Israeli Journal of Aquaculture - Bamidgeh, 46(4), 182-196.

16. Mohammad SZ, 1982. Biological studies on fishes of lake Timsah. M. Sc. Thesis, Faculty of Science, Suez Canal University. Mar. Sci. Dept., 180 pp.

17. Pillay TVR 1952. A critique of the methods of study of food of fishes. Zool. Soc. India. 4: 181 – 199.

18. Rasheed ER 2012. Some ecological and biological studies on some species of family Mugilide inhabiting Susa coast, El-Gabal Al-Akadar, Libya, MSc. Thesis, Fac. Of Sci. Zool Dept. Omar El-Mukhtar Univ. pp. 122.

19. Thomson JM 1966. The grey mullets. Oceanogr. Mar. Biol. Annu. Rev., 4, 301-335.

20. Thomson JM, 1990. Mugilidae. Check-list of the fishes of the eastern tropical (Clofeta). In: J.C. Quero JC Hureau CA, Post & L. Saldanha (Editors). UNESCO, Paris, vol. 2, pp. 857-858.

21. Wijeyaratne MJS and Costa HH, 1986. On the biology an estuarine population of grey mullet, *Mugil cephalus* L. in Negombo lagoon, Srilanka. Cybium. 10 (14): 351-363.

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