International Journal of Fisheries and Aquaculture Research

Vol.4, No.1, pp.1-8, February 2018

Published by European Centre for Research Training and Development UK (www.eajournals.org)

SOME ASPECTS OF THE REPRODUCTIVE BIOLOGY OF THE LONG FIN GURNARD ASPITRIGLA OBSCURA (LINNAEUS, 1764) IN DERNAH COAST, EASTERN LIBYA

Mohammad A. El-Mabrouk*, Ramadan A. S. Ali and Sayed M. Ali

Zoology Department, Faculty of Science, Omar Almokhtar University, P.O. Box 919 Albaida, Libya

ABSTRACT: *The reproductive biology of 389 specimens of Aspitrigla obscura (Family: Triglidae) obtained from catches collected by gill and trammel nets from Dernah coast, eastern Libya, Mediterranean Sea, was established during a one year study period (April, 2013 to January 2014). There were monthly variations in sex ratio between males (193 fish = 49.6%) and females (196 fish = 50.4%). The overall sex ratio was 1: 1.02 in favor of females. The breeding season extended from December to May. Oocyte diameters increased gradually and progressively during October (87 ± 4.27 µm) to December (250 ± 40.38 µm), then recorded highest values of 367 ± 41.39 in January to 567 ± 21.14 in May. The average absolute fecundity ranged from 535±33.9 in October to 8891±1231.4 in May for fish of total length ranging from 19.1 to 33.9 cm.. Overall absolute fecundity was 5875±503.1, whereas overall relative fecundity was 176±23.3cm^{-1}.*

KEYWORDS: Triglidae, Aspitrigla Obscura, the Long Fin Gurnard, Reproductive Biology, Mediterranean Sea, Eastern Libya.

INTRODUCTION

Family Triglidae includes bottom fish dwellers occurring over sand, muddy sand or gravel beds at depth from 56 to 200m, but is more common between 50 and 170 m (Hureau, 1986). The long fin gurnard *Aspitrigla obscura* is found in a wide variety of locations that range from the Atlanto-Mediterranean from the British Isles to the Azores and Madeira. Like all gurnards it has a large head, and reaches a maximum length of 40 cm, although most individuals range from 15 to 35 cm (Papaconstantinou, 1981). It feeds on shrimps, polychaetes, fish parts and mollusks (Terrats *et al*., 2000). This species is caught with bottom trawls but also with long lines and band lines (Lewis and Yerger, 1976). It is one of the most popular Triglid fish species in the eastern Mediterranean region and the Atlantic coast (Moreno and Matallans, 1983 and Baron, 1985) and has been characterized by high appreciated flesh and good market perspectives.).

Few works have been published on the biology of Triglid fishes in eastern Mediterranean Sea (Awad, 1972; Papaconstantinou, 1982; Tsimenides *et al*., 1992; Terrats et *al*., 2000 and Ahamed, 2012). The present work is the first study on the reproductive biology of *Aspitrigla obscura* in the eastern coast of Libya.

MATERIAL AND METHODS

Monthly samples of *Aspitrigla obscura* were collected during April (2013) to March (2014) by gill and trammel nets from Dernah coast which is located along the eastern most stretch of Libya Mediterranean coast on (32^0 39` 26" N – 23$^0$ 00` 37" E) (Fig. 1).

Print ISSN: ISSN 2397-7507, Online ISSN: ISSN 2397-776

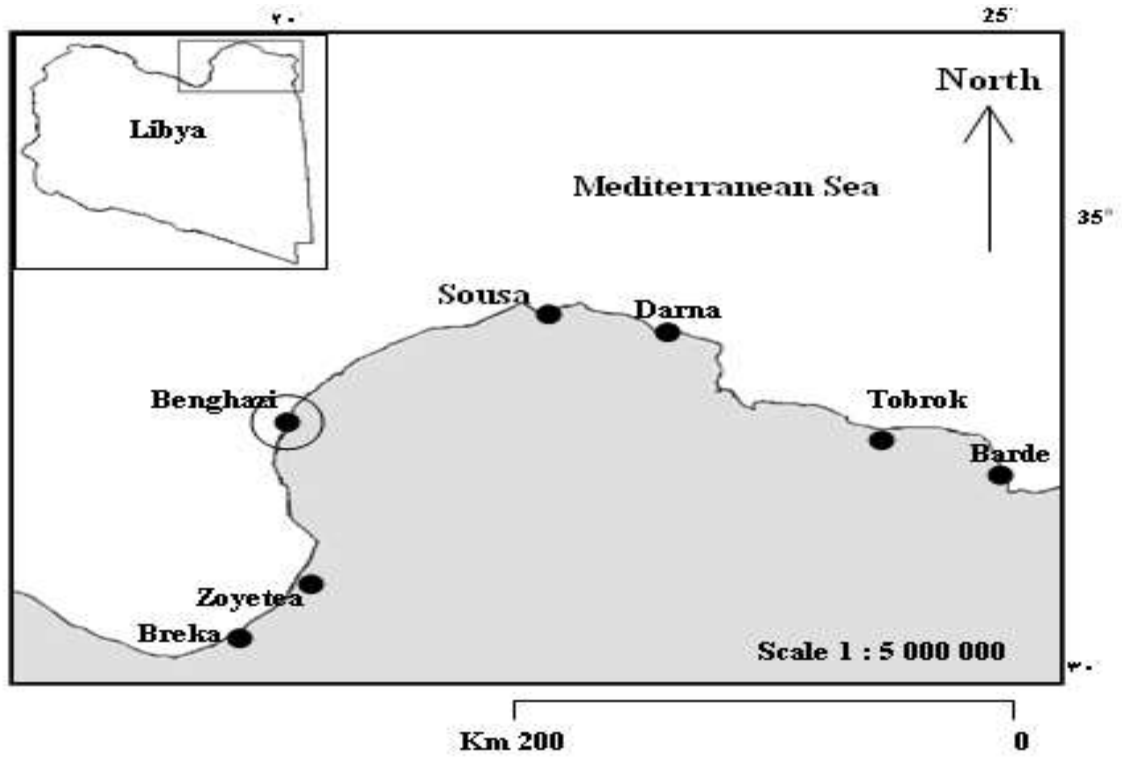

FIGURE 1: DERNAH COAST, ON THE MEDITERRANEAN SEA, EASTERN LIBYA.

A total of 389 *Aspitrigla obscura* were used for studying the reproductive biology of the fish. Each fish was wet weighed in grams, its total length measured in cm and dissected to determine sex, then the gonads were removed and wet weighed to the nearest mg.

The monthly Gonado-somatic index (G.S.I.) was calculated according to the following formula:

G.S.I. = wet weight of gonad (g) / wet weight of fish (g) X 100 (Buxton, 1989).

Oocyte diameters were measured each month to the nearest 0.01 mm by using a microscope fitted with an eyepiece micrometer.

Oocytes of idividual fish comprising the monthly samples were separated from the ovarian tissue and put in separate containers containing saline solution (0.9% NaCl) for 24 hours, then 20 non deformed oocytes were taken randomly from each container and their diameters measured under the microscope at 40 X.

Mean oocytes diameter was then calculated for each fish and then for each month.

Fecundity was estimated by counting all ripe eggs found in the female ovary just prior to spawning. Individual ovaries were put in small divided Petri-dish; ova were separated from the

Print ISSN: ISSN 2397-7507, Online ISSN: ISSN 2397-776

ovarian tissue with the aid of a dissecting needle, and all ripe ova were counted under a binocular microscope.

RESULTS

Sex ratio

The overall sex ratio during the study period was in favor of females: 1: 1.02. (Table 1). The numbers of females exceeded males during all months except for the period from June to November.

Table 1: Monthly variations in sex ratio of *Aspitrigla obscura* from Dernah coast.

Months	No. of fish	Males		Females		Males:Females
		No.	%	No.	%	Sex ratio
Apr.(2013)	52	19	36.5	33	63.5	1 : 1.74
May	37	17	45.9	20	54.1	1 :1.18
Jun.	32	24	75.0	8	25.0	1 :0.33
Jul.	42	32	76.2	10	23.8	1 : 0.31
Aug.	28	15	53.6	13	46.4	1 : 0.87
Sep.	20	11	55.0	9	45.0	1 :0.82
Oct.	33	21	63.6	12	36.4	1 : 0.57
Nov.	22	12	54.5	10	45.5	1 :0.83
Dec.	21	10	47.6	11	52.4	1 : 1.10
Jan. (2014)	34	10	29.4	24	70.6	1 : 2.40
Feb.	33	12	36.4	21	63.6	1 :1.75
Mar.	35	10	28.6	25	71.4	1 : 2.50
Total	**389**	**193**	**49.6**	**196**	**50.4**	**1 : 1.02**

Gonado-Somatic Indices (G.S.I.)

The monthly changes in G.S.I. are represented in Fig. 2. *Aspitrigla obscura* showed a definite breeding season, which extended from December to May. The average G.S.I. increased gradually from June (0.77) till December (1.81), then increased sharply from January (4.77) till May (7.89). The sharp drop occurred during May/June indicated the onset of the spawning period

Print ISSN: ISSN 2397-7507, Online ISSN: ISSN 2397-776

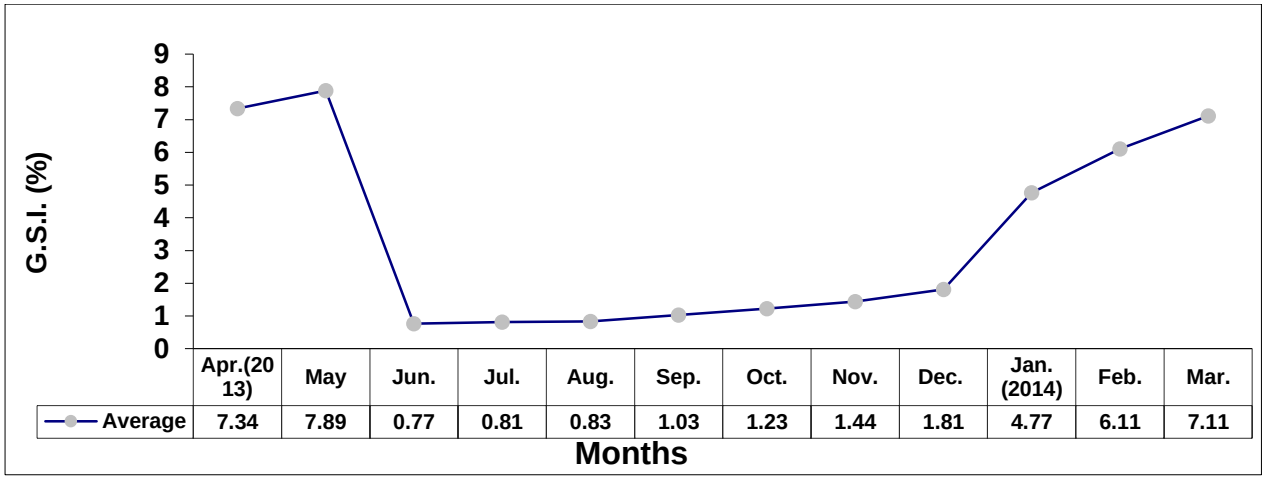

Figure 2: Monthly variations in average gonado-somatic indices of *Aspitrigla obscura* from Dernah coast.

Oocyte Diameter

Obtained monthly oocyte diameters of *Aspitrigla obscura* during the study are represented in Table 2. The minimum monthly oocyte diameter was recorded in October (87±4.27µ). The oocyte diameter then gradually and progressively increased from November (129±13.50µ) to reach the maximum in May (567±21.14 µ). The egg diameter was not measured during June to September because oocytes were either absent or too small to be seen or measured.

Table 2: Monthly variations in egg diameters (µ) of *Aspitrigla obscura* from Dernah coast (A: Oocytes were absent or too small to be measured).

Months	Number of fish	Egg-Diameters (µ)		
		Minimum	Maximum	Average
Apr. (2013)	13	517	588	551±22.31
May	11	531	594	567 ± 21.14
Jun.	A	A	A	A
Jul.	A	A	A	A
Aug.	A	A	A	A
Sep.	A	A	A	A
Oct.	8	81	93	87 ± 4.27
Nov.	7	111	141	129 ± 13.50
Dec.	8	210	289	250 ± 40.38
Jan. (2014)	13	239	480	367 ± 41.39
Feb.	12	388	511	453 ± 42.81
Mar.	17	428	579	544 ± 34.18
Average				458±31.27

Print ISSN: ISSN 2397-7507, Online ISSN: ISSN 2397-776

Fecundity

Two terms are applied in fish fecundity studies; the absolute fecundity which is the total number of mature eggs in the ovary and the relative fecundity which is the number of eggs per unit length or weight of the fish (Nikolsky, 1963). In the present study the smallest mature female had a total body length of 19.1cm and body weight of 41.9 g. Its ovary weight was 0.38 g. (0.91% of the body weight), with absolute fecundity of 511 ripe eggs. The largest female had a total body length of 33.9 cm and body weight of 311.4 gm, whereas its ovary weight was 24.6 g. (7.89% of the body weight) and its absolute fecundity was 10733 ripe eggs. The relationship between the body length and absolute fecundity of *Aspitrigla obscura* is given in Table (3). Average absolute fecundity ranged from 535±33.9 in October to 8891±1231.4 in May for fish with total length ranging from 19.1 to 33.9 cm, with overall absolute fecundity of 5875±503.1, whereas overall relative fecundity was 176±23.3 cm^{-1}.

Table 3: Absolute and relative fecundity of *Aspitrigla obscura* from Dernah coast during the period from April 2013 till March 2014.

Months	Range of total length	No	Absolute Fecundity			Relative Fecundity
			Minimum	Maximum	Average	F/T.L. (cm)
Apr.(2013)	27.1 - 33.8	13	1123	10291	7677±1113.1	233±33.1
May	29.4 - 33.9	11	1349	10733	8891±1231.4	249±71.1
Oct.	19.1 - 32.9	8	511	599	535±33.9	22±3.4
Nov.	19.1 - 32.8	7	623	711	669±71.1	31±7.1
Dec.	19.1 - 32.8	8	666	749	717±99.3	39±7.9
Jan. (2014)	22.1 - 32.9	13	788	8989	4988±123.3	141±11.3
Feb.	24.1 - 32.8	12	811	9123	5967±339.8	172±20.9
Mar.	25.1 - 32.8	17	927	10190	6555±1011.3	202±29.8
Average					5875±503.1	176±233

DISCUSSION

Triglid fishes inhabit tropical and temperate coastal water. They are found near the shore in shallow inlets and bays commonly 5 to 20 m deep (Tsimenides *et al*., 1992; Banon *et al*., 2010) where they inhabit sandy and muddy bottoms. *Aspitrigla obscura* is the largest and oldest of the European gurnards after *Trigla lucerna*, reaching a maximum length of 40 cm and 8 years (Baron, 1985). In the current study *Aspitrigla obscura* was caught from shallow shores with sandy to rocky bottoms. Total length of the studied samples ranged from 14.1 to 33.9 cm. The overall sex ratio was 1:1.02 in favor of females. This is close to the sex ratio reported for other species of Family Triglidae in the Mediterranean Sea (Gaertner *et al*., 2005; Ahamed, 2012 and

Print ISSN: ISSN 2397-7507, Online ISSN: ISSN 2397-776

Agbali andEl-Mor, 2015). In the present work, the sex ratio was not constant throughout different months of the year. During the spawning season, the number of females of *Aspitrigla obscura* exceeded males. The males might have migrated for spawning elsewhere before females. This is in agreement with Aamed, (2012) who studied sex ratio of *Trigla lucerna* in Benghazi coast, eastern Libya. This phenomenon was also shown by other fish species such as mullets (Mohammad, 1982 and El-Mor, 1993). An alternative explanation for the dominant female ratio is that ripe females are heavier than male's during the spawning season, so that, the females get caught in the gear in large numbers, resulting in an unbalanced sex ratio (Awad, 1972 and Papaconstantinou, 1982). In general, the variations in the sex ratio at different sizes are related to unequal rates of growth and mortality (*Turner et al*., 1983) In the present study, the males and females of *Aspitrigla obscura* showed a definite breeding season, which extended from December till May, with maximal G.S.I.. The increase of G.S.I. during the breeding season is mainly due to the deposition of large amounts of proteins and lipids in the developing eggs and spermatozoa. Part of these materials comes directly from ingested food but a major proportion comes from the reserve of food deposits in organs such as liver, muscles and fat bodies (Larson, 1974). The spawning season of *Aspitrigla obscura* (December to May) agrees with that reported for other sites in the Mediterranean Sea. Baron (1985) reported that it extends from January till April in various ports along the Costa Brava (Northwest Mediterranean). It extends from January to March in Benghazi coast, eastern Libya (Ahamed, 2012). Muñoz *et al*., 2003, reported that regarding *Aspitrigla obscura* in ports along the Costa Brava (Northwest Mediterranean) multiple spawning takes place between January and April, consisting of between 7000 and 22500 eggs, each more than 1000 µm in diameter. The fecundity of the species is determined by the size and weight of the individuals. The time of spawning season in the present study coincided with the appearance of the juveniles and fry of the fish in the Mediterranean Sea (El-Mor, 2002). In the current work, the increase in the oocyte diameters of *Aspitrigla obscura* was evident in December (250±40.38µ), this increase continued in the following months, reaching (367±41.39 µ) in January and climaxed to 567±21.14 µ in May. The egg diameter was not measured during June to September as eggs were either absent or too minute to measure. These results are in agreement with Ahamed (2012) who stated that for *Trigla lucerna* in Benghazi coast, eastern Libya, the egg diameters reached 465 µ, 480 µ and 498 µ during the spawning season (January to March). The number of eggs produced by females varies greatly according to species, size, age, region, period and techniques used; thus a considerable variability has been shown in different populations (Oren, 1975). Ahamed (2012) found that absolute fecundity ranged from 678 to 10047 with an average of 5010 ripe eggs/fish, and an average relative fecundity of 254 ripe eggs/cm. for *T. lucerna*; these results are close to those of the of present study where the average absolute fecundity ranged from 535±33.9 in October to 8891±1231.4 in May for fish with the total length ranging from 19.1 to 33.9 cm, with overall absolute fecundity of 5875±503.1, whereas overall relative fecundity was 176±23.3 cm-1.

REFERENCES

Agbali, Muna and Mohammed El-Mor, (2015). Some aspects of the Reproductive Biology of the Piper Gurnard Trigla Lyra (Linnaeus, 1758) in Dernah Coast – Eastern Libya. Int. J. of Pharm. Life Sci.) 6(5): May, 2015:4445-4451.

Print ISSN: ISSN 2397-7507, Online ISSN: ISSN 2397-776

Ahamed, I. A. (2012). Reproductive biology of the tub gurnard *Trigla lucerna* (linnaeus, 1758), in the Libyan eastern coast of Mediterranean Sea. Egypt. J. Aquat. Biol. & Fish., Vol. 16, No. 1: 95 – 104.

Awad, H. E. (1972). A comparative study on certain species of family Triglidae in the Mediterranean Sea off Alexandria. M.Sc. Thesis, Faculty of Science.Alexandria University.

Bañon, R., D. Villegas-Ríos, A. Serrano, G. Mucientes and J.C. Arronte (2010). Marine fishes from Galicia (NW Spain): an updated checklist. Zootaxa 2667: 1-27.

Baron, J. (1985). Les Triglides (Teleosteens, Scorpaeniformes) de la baie de douarnenez. II. La reproduction de. *Eutrigla gurnardus, Rrigla lucerna, Trigloparus* lastoviza et Aspitrigla cuculus. Cybium 9: 255-261.

Buxton, C, D. (1989). Protogynous hermaphroditism in Chrisoblephus laticeps (Cuvier) and C. cristiceps (Cuvier) (Teleosti: Sparidae) S. Afr. J. Zool., 24:212-216.

El-Mor, M. (1993). Fisheries and biological studies on some species of family Mugilidae inhabiting the Suez Canal. M.Sc. Thesis, Faculty of Sci., Suez Canal Univ., ARE, pp.100.

El-Mor, M. (2002). Ecological and biological studies on commercial juvenile fishes from Port Said coast. Ph.D. Thesis, Faculty of Sci., Suez Canal Univ., ARE, 215 pp.

Gaertner, J.C., J.A. Bertrand, D. Samani and A. Souplet (2005). Spatio-temporal organization patterns of demersal assemblages of the east coast of Corsica (Mediterranean Sea). Vie. Et. Milieu-Life and Environment 55:205-213.

Hureau, J. C. (1986). Triglidae, pp. 1230-1238. In P.J.P. Whitehead, M.L. Bauchot, J.-C. Hureau,J. Nielsen & E. Tortonese (eds.). Fishes of the Northeastern Atl a n t i c aild the Med iterranean I Poissons de

l' Atlantique du Nord et de la Méditerranée. Vol. 1II. UNESCO, Paris.

Larson, G. L. (1974). Liver weight of brook trout in a high mountain lake in Washington State. Prog. Fish. Cult., 35:234-236.

Lewis, T. C. and Yerger, R. W. (1976). The biology of five species of sea robins (Pisces, Triglidae) from the Northeastern Gulf of Mexico. Fishery Bulletion 74(1): 93-103.

Mohammad, S. Z. (1982). Biological studies on fishes of Lake Timsah. M. Sc. Thesis, Faculty of Sci., Suez Canal Univ., ARE, 100 pp.

Moreno, R. and Matallanas, J. (1983). Etude du regime ali mentaire de *Lepidotrigla cavillone* (L. 1801) (Pisces Triglidae) dans la mer catalane, Cybium. 7: 93-103.

Muñoz, M., M. R. HERNÁNDEZ, M. SÀBAT, M. CASADEVALL, (2003). Annual reproductive cycle and fecundity of *Aspitrigla obscura* (Teleostei, Triglidae). VIE ET MILIEU, 2003, 53 (2-3) : 123-129.

Nikolsky G.V. (1963). The ecology of fishes. 6. edn. Academic Press, London

Oren, O. H. (1975). Opening address IBP/PM international symposium on the grey mullet and their culture. Aqua., 5:3-8.

Papaconstantinou, C. (1981). Age and growth of piper, *Trigla lyra*, in Saronikos Gulf (Greece). Cybium 5(2):73-87.

Papaconstantinou, C., (1982). Epi tes biologias tou eidous *Lepidotrigla cavillonae* ton ellinikon talasson. Talassographica. 1:127-137.

Terrats, A.; Petrakis, G. and Papaconstantinou, C. (2000). Feeding habits of *Aspitrigla calculus* (red gurnard) around Cyclades and Dodeconese Islands eastern Mediterranean, Med. Mar. Sci. 1:91-104.

Tsimenides, N., A. Machias and A. Kallianiotis, (1992). Distribution patterns of triglids (Pisces: Triglidae) on the Cretan shelf (Greece), and their interspecific associations. Fish. Res. 15(1-2):83-103.

Print ISSN: ISSN 2397-7507, Online ISSN: ISSN 2397-776

Turner SC, Grimes CB, Able KW (1983). Growth, mortality, and age/size structure of the fisheries for the tilefish, Lopholatilus chaemaelonticeps, in the middle Atlantic-Southern New England region. Fish Bull 81: 751-763.

Print ISSN: ISSN 2397-7507, Online ISSN: ISSN 2397-776