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Distribution of red belly tilapia *Coptodon zillii* (Gervais, 1848) larvae in Shatt Al-Arab River and East Hammar marsh, Iraq

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Abstract: The larvae of *Coptodon zillii* were surveyed in Shatt Al-Arab River and East Hammar marsh from January 2015 to December 2015. A total of 127 *C. zillii* larvae were collected from three stations. The highest number of *C. zillii* larvae was 78 recorded at station 1 in East Hammar marsh (Mansoury), comprised 61.41% of the total fish larvae collected, and the lowest number (23) was from station 3 in Shatt Al-Arab River near Abu Al-Khaseeb, comprised 18.11% of the total fish larvae collected. *C. zillii* larvae were found in the study regions from April to October. The peak of abundance was 22.8 larvae/10m² during July at station 1. The lower abundance of larvae was 0.7 larvae/10m² in June at station 2 at the confluence of the Garmat Ali River with Shatt Al-Arab River. Water temperatures in the three sampling stations were similar and ranged from 12°C in December to 32 °C in July. Salinity in station 1 ranged from 1.2‰ in August to 2‰ in June while in station 2 it ranged from 1.03‰ in October to 2.8‰ in July and in the station 3 ranged from 2.7‰ in April to 6.1‰ in December during the study period. Positive correlation was shown between water temperature and salinity in all stations with the number and abundance of *C. zillii* larvae. The results indicated that the Shatt Al-Arab River and East Hammar marsh are spawning grounds for this species.

Key words: Exotic fish, *Coptodon zillii* larvae, Shatt Al-Arab River, East Hammar marsh, Iraq.

Introduction

The *Coptodon zillii* (Gervais, 1848) is of widespread distribution in tropical and sub-tropical regions of Africa and Eurasia (El-Shazly, 1993). *Coptodon zillii* is highly euryhaline which can tolerate a wide range of salinity (El-Sayed, 2006), and can grow, survive, and reproduce at 10-30‰, depending on the size and sex (Meyer, 2002). It has been introduced in many countries for production and vegetation control purposes (Negassa and Getahun, 2004).

Redbelly tilapia inhabits the brackish and fresh waters, and frequents the upper waters in the lagoons. It usually lives in water depths up to 1m (Agnèse *et al*., 1998; Kariman and Nadhan, 2010).

Al-Sa'adi (2007) recorded *T. zillii* (=*C. zillii*) at Al-Musaib on the Euphrates River in

Iraq. Mutlak and Al-Faisal (2009) recorded two species: *Tilapia zillii* (=*Coptodon zillii*) and *Oreochromis aureus* from the main outfall drain in Basrah. Qadoory (2012) studied the reproductive cycle of *T. zillii* in Al-Swaib and Al-Ghatira marshes, south of Iraq.

Studies of the distribution of *C. zillii* larvae in Shatt Al-Arab River and East Hammar marsh are limited to that of the Al-Okailee (2016), who found *T. zillii* (=*C. zillii*) larvae at the confluence of Garmat Ali River with Shatt Al-Arab River.

The present study aimed to determine the distribution and abundance of *C. zillii* larvae in the Shatt Al-Arab River and East Hammar marsh, Iraq.

Materials and methods

Monthly samples of fish larvae were collected from Shatt Al-Arab River and East Hammar marsh during the period from January to December 2015. Three stations were selected. Station 1 was located at the East Hammar marsh (Mansoury), station 2 is located at the confluence of the Garmat Ali River with Shatt Al-Arab River, and the third station is located near Abu Al-Khaseeb city (Fig. 1). Samples were collected by a net of a mesh size of 500 µm, 1-meter length; the upper opening of the net is 50 cm. The net was equipped with a flow meter (Model 2536B). Oblique tows were made at a speed of 0.5 m/s for approximately 10 minutes from near the bottom to the surface (Robinson *et al*., 1996).

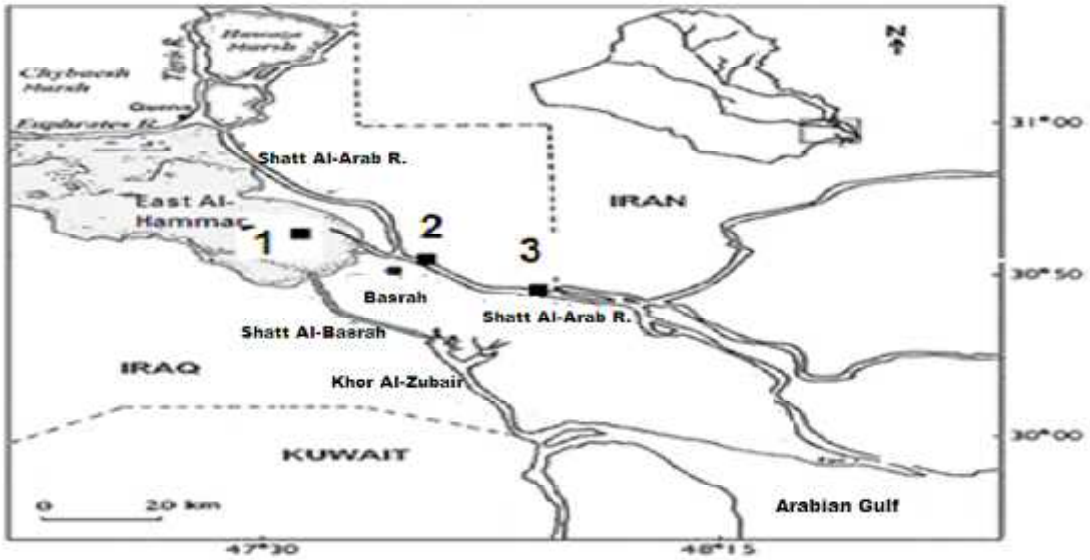

Fig. (1): Map of southern of Iraq, showing the sampling stations in Shatt Al-Arab River and East Al-Hammar marsh. (From Department of Marine Geology, Marine Science Centre (MSC).

Plankton samples were preserved in 10% formalin, examined under the microscope and identified according to Omatosh (1988).

Abundance of larvae was calculated according to the formula of (Smith and Richardson, 1977):

$$A=N\times D\times 10/ V$$

Where:

A= abundance under 10m² of water surface.

N= number of fish larvae.

D= depth of tow (m).

V= volume of water filtered (m³).

The correlation coefficients between different environmental parameters and number of fish larvae were calculated (n= 18, $p\leq 0.05$), considering the correlation coefficient as significant at $r \geq 0.505$. All statistical computations were made using SPSS software (version 11, 2001) statistical package.

Results

Temperature and Salinity

Water temperature was similar within the three sampling stations (Fig. 2). It decreased during winter reaching the minima in December (12°C) at station 1. Then, it rose to reach the maxima during the summer in July (32°C) at station 2.

Salinity varied between the three stations. Salinity in station 1 ranged from 1.2‰ in August to 2‰ in June, while in station 2 it ranged from 1.03‰ in October to 2.8‰ in July and in station 3 it ranged from 2.7‰ in April to 6.1‰ in December during the study period (Fig. 3).

Spatial distribution

During the present survey, a total of 127 *C. zillii* larvae were collected from the study stations. Table (1) shows the total number and percent composition of *C. zillii* larvae collected at the three stations in the Shatt Al-Arab River and East Hammar marsh. The *C. zillii* larvae of station 1 constituted 61.41% of the total number of larvae, in station 2 it constituted 20.48% of the total number of larvae, while in station 3 it constituted 18.11% of the total number of larvae.

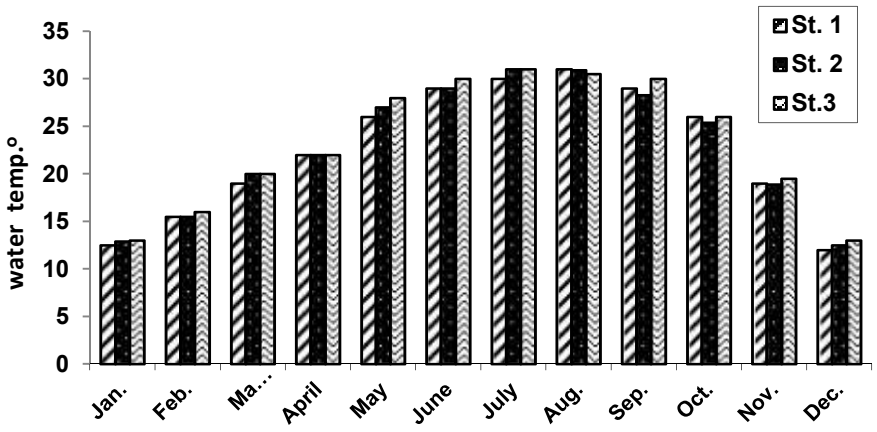

Fig. (2): Monthly variation in water temperature (°C) at the studied stations during the period from January to December 2015.

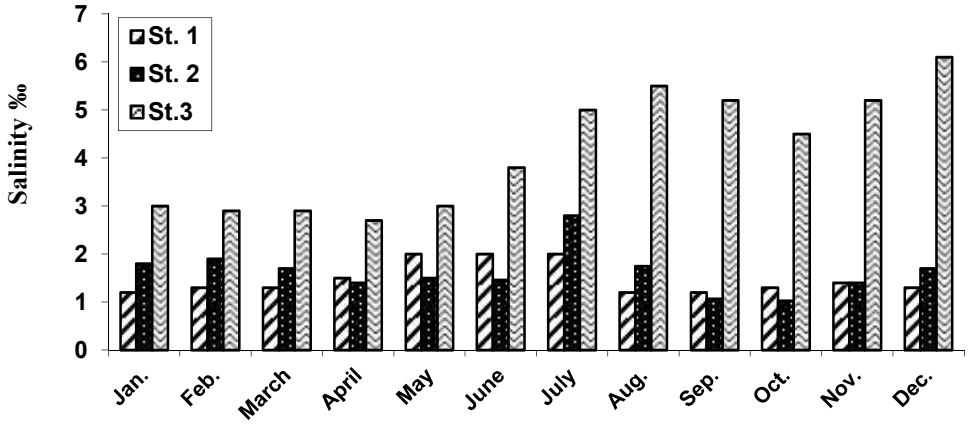

Fig. (3): Monthly variations in salinity (‰) at the studied stations during the period from January to December 2015.

Table (1): Total number and percent composition of *C. zillii* larvae collected from the studied stations during the period from January to December 2015.

Stations	Total number	%
1	78	61.41
2	26	20.48
3	23	18.11
Total	**127**	**100**

Seasonal distribution

The abundance of larvae taken from the studied stations are given in table 2. It is clear that spawning activity of *C. zillii* occurred during the period from April to October. *C. zillii* larvae were recorded in station 1 during the period from April to September, with the peak of abundance (22.8 larvae/10m²) in July. The peak of abundance at station 2 was 10.2 larvae/10m² in August, and at station 3 it was 8.8 larvae/10m² in July.

Table (2): The abundance (larvae/10m²) of *C. zillii* larvae collected from the studied stations during the period from January to December 2015.

Months	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	-	-	-	3.9	8.4	10.6	22.8	7.7	2.9	-	-	-
2	-	-	-	-	1.4	0.7	-	10.2	2.9	2.9	-	-
3	-	-	-	-	-	3	8.8	5.6	-	-	-	-

Water temperature showed a significant correlation with the number and abundance of *C. zillii* larvae at stations 2 and 3 ($r = 0.870$, $r = 0.993$, $r = 0.870$, $r = 0.998$, $p < 0.05$ respectively), while the salinity showed significant correlations with number and abundance of *C. zillii* larvae at stations 1 and 3 ($r = 0.743$, 0.698, 0.647, 0.642, $p < 0.05$, respectively).

Discussion

The occurrence of *C. zillii* larvae at stations 1, 2 and 3 indicates that these regions are spawning grounds for this fish (Mutlak and Al-Faisal, 2009; Qadoory, 2012).

The present study showed that the occurrence of *C. zillii* larvae coincides with the adult fish maturation cycle as indicated by Qadoory (2012), who mentioned, according to the results of a histological study, that the activity of reproduction for *C. zillii* was year-round in Al-Swaib and Al-Gatra marshes, but this activity has been uneven during different months, with limited numbers from September to February and March to June. Also, Negassa and Prabu (2008) showed that breeding in *T. zillii* was year-round with its

peak during April to September in Lake Zwai, Ethiopia.

Redbelly tilapia *T. zillii* under natural conditions adopts a multiple spawning strategy (Mahamoud *et al.*, 2011). It generally displays a breeding season of about eight months which is coincided with optimum conditions for food availability and fry survival. According to Peters (1983), wild tilapias spawned at least twice a year. Differences in population spawning periods in different areas may be due to genetic and environmental factors (Roomiani *et al.*, 2014). The spawning season of *C. zillii* in the study area was confined from April to October, no larvae were collected during the period from November to March, where surface temperature was 18-32°C and salinity 1.2-5.5‰, coinciding with the increasing temperatures in spring and summer which accelerated the production cycle of plankton and also decomposition rates of organic materials, i.e. more food resources become available for fish larvae (Al-Sodani *et al*., 2007; Hammadi *et al*., 2007). It seems that temperature is the most important factor in the spawning of *C. zillii* (Khaefi *et al*., 2014).

The present study demonstrated that *C. zillii* can survive and reproduce in a wide range of salinity. This observation is conformed with reports indicated that *C. zillii* can tolerate, survive and breed at a wide range of salinity (Meyer, 2002; El-Sayed, 2006).

Conclusions

Shatt Al-Arab River and East Hammar marsh are considered as spawning grounds for *C. zillii*.

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