



International Journal of Fisheries and Aquatic Studies

E-ISSN: 2347-5129

P-ISSN: 2394-0506

(ICV-Poland) Impact Value: 5.62

(GIF) Impact Factor: 0.549

IJFAS 2018; 6(4): 449-450

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www.fisheriesjournal.com

Received: 12-05-2018

Accepted: 15-06-2018

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The first record of *Torquigener flavimaculosus* (Tetraodontiformes: Tetraodontidae) from Libya

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Abstract

The Yellow spotted puffer belongs to the Tetraodontidae family and is one of the seven non-native puffer fish found in Mediterranean Sea. The species is a lessepsian migrant, currently displaying an expansion towards the north and the west of the basin, similar to other lessepsian immigrant species. Hereby, we present the first record of the species from the Libyan waters.

Keywords: Mediterranean, yellow spotted puffer, lessepsian immigrant, range expansion

1. Introduction

The Yellow spotted puffer, *Torquigener flavimaculosus* (Hardy & Randall, 1983), is a pufferfish distributed in the western Indian Ocean from the Red Sea to the Persian Gulf and south Madagascar. Is a reef-associated species found at depths ranging from 3 to 57 meters, feeding on marine invertebrates and reaching a maximum total length of 13.0 cm. *Torquigener flavimaculosus* is characterized by a round head with blunt snout, two large beak-shaped teeth in each jaw and an inflatable body, small dorsal and anal fins located posteriorly in position, wide based pectoral fin (Golani *et al.*, 2002) ^[7]. The species is alien in the Mediterranean Sea, infiltrated through the Suez Canal (Golani *et al.*, 2006) ^[8], recorded for the first time in Haifa Bay in Israel 1987 (Golani, 1987) and then in Turkey, Greece, Syria and Egypt (Farrag *et al.*, 2016) ^[5] and all references included).

Recently, citizen science is emerging as an important tool for the detection of rare and alien marine taxa in global and Mediterranean level (Giovos *et al.*, 2018 and all references included) ^[6]. Citizen scientists, such as fishermen, divers, shell collectors and sea enthusiasts, along with the increasing use of social networks are providing important information for filling the knowledge gaps in marine biodiversity (Newman *et al.*, 2012) ^[11] and on biological invasions (Cardoso *et al.*, 2017; Giovos *et al.*, 2018) ^[4, 6]. Hereby, we present the first record of *T. flavimaculosus* in the Libyan water provided by a professional fisherman in the context of the citizen science project Marine Biology in Libya

2. Materials and Methods

In 2013, the marinebiology.ly website was created in Libya aimed at enhancing public awareness and establishing collaboration with the local community of marine observer for monitoring the marine biodiversity. Fishermen, divers and other sea users regularly report their observations of marine animals to the project with photos and information about the approximate size (length and/or weight), the depth, the number of specimens, the exact location, the date and the type of observation (free diving, underwater photography, shore-based fishing, boat-based fishing, spearfishing). Taxonomic experts photo-identify the species when possible and the project manager inform the observers about the species and record the observations in the project's database.

3. Results

On 24th of December 2017 a professional fisherman caught an individual of *T. flavimaculosus* in Al-Tamimi, located west Tobruk City, Libya (32°22'35.3"N 23°10'30.9"E; Fig. 1A) of approximately 12 cm. total length with trammel net, at a depth of 15 m (Fig. 1B). The fisherman captured a photo of the specimen and report it to the marinebiology.ly website providing all the additional information requested. The fish photo-identified based on the combination of the following unique characteristics that differ from the other Mediterranean

tetraodontids: a distinct chin, two branched lateral lines, truncated caudal fin, two rooted body spines, and a midlateral line of small brownish/greenish spots separating the dark back from the white belly. The fishermen informed about the toxicity of the species (Kosker *et al.*, 2018) ^[9] and dispose the fish.

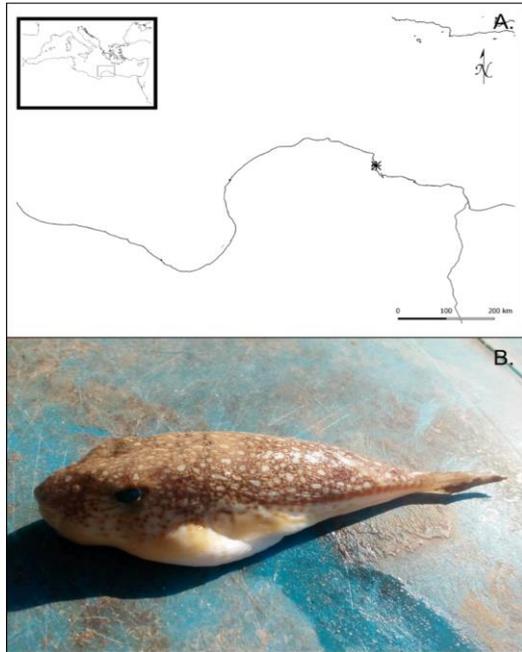


Fig 1: A. The map displays the record of *T. flavimaculosus* from Libya. B. The individual of *T. flavimaculosus* found in Libya

4. Discussion

To our knowledge seven non-native species of the Tetraodontidae family (pufferfishes) are present in the Mediterranean Sea with the majority introduced through the Suez Canal and distributed in the Eastern Mediterranean basin (CIESM, 2002; Matsuura, *et al.*, 2011) ^[7, 10]. To date, the distribution of *T. flavimaculosus* reflects the typical north and east expansion of most Lessepsian migrants to the Mediterranean, such as *Lagocephalus sceleratus* (Akyol and Ünal, 2017) ^[11]. After the first record of the species in the Egyptian waters, Farrag *et al.* (2016) ^[5] suspected, its expansion in neighbouring countries towards the west of the Mediterranean basin, such as Libya, Tunisia, and Algeria. The record presented in this study confirm this theory.

The on-going climate change in the eastern Mediterranean basin (Raitsos *et al.*, 2010) ^[12] favours the expansion and establishment of several tropical and subtropical species through the Suez Canal. Libya belongs to the south, warm part of the central Mediterranean, with a high potential to host thermophilic species such as Lessepsian immigrants (Shakman *et al.*, 2017) ^[14]. However, the inventory of non-indigenous species in the country is potentially incomplete, due to fragmented research efforts and lack of long-term monitoring (Shakman, 2008; Bazairi *et al.*, 2013; Shakman *et al.*, 2017) ^[13, 2, 14]. Citizen science can provide vital information on the occurrence and the expansion of new alien species (Zenetos *et al.*, 2013) ^[15], thus efforts like Marine Biology Libya should be supported and enhanced for contributing in the update of the checklist of non-indigenous species in the country.

5. Acknowledgements

The authors are grateful to the fisherman Ashor Alsaede for sharing his information and pictures.

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