



Feeding Ecology of *Pterois volitans* on the Coral Reefs of Northern Veracruz, Mexico



Carlos González-Gándara*, Pastor Alberto Escarcega-Quiroga and Seth Donovan Flores-Serrano

Facultad de Ciencias Biológicas y Agropecuarias, Universidad Veracruzana, Mexico

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Corresponding author: Carlos González-Gándara, Laboratorio de Arrecifes Coralinos, Facultad de Ciencias Biológicas y Agropecuarias, Universidad Veracruzana, Tuxpan, Veracruz, Mexico Email: cggandara@hotmail.com

Abstract

Knowledge of the lionfish's diet composition on a regional scale is essential to assess the impact that an increase in population density can have on native populations. This paper documents for the first time the diet of *Pterois volitans* in coral reefs of Veracruz (southwestern Gulf of Mexico). For this, 29 organisms from three reefs in northern Veracruz were analyzed. 95.2 % of the stomach contents of lionfish were represented by fish and 4.8 % by crustaceans. Among the most frequent species in the diet of *P. volitans* were: *Halichoeres burekai*, *Chromis scotti*, *Malacoctenus triangulatus* and *Tigrigobius redimiculus*. The results reveal that the increase in the population density of the lionfish in the region may represent a threat to the regional endemic species.

Keywords: Lionfish; Diet composition; Coral reefs; Gulf of Mexico

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Introduction

Knowledge of the feeding ecology of the lionfish in the reefs of Veracruz is fundamental to assess the impact that this species can have on native fish populations and particularly on regional endemics [1], given that *Pterois volitans* is a generalist and voracious predator [2,3]. Although the lionfish was recorded since 2011 in the reef formations of Veracruz [4], knowledge of its biology is limited. Recently, the lionfish diet was published based on catches made in the soft bottom areas near the Veracruz Reef System [5]. This research concludes that the diet of *P. volitans* includes fish linked to the substrate, but there is no certainty that the recorded components are associated with reef structures. In the present investigation, an evaluation of the diet of lionfish from organisms captured in coral reefs of northern Veracruz is presented for the first time, in order to understand the lionfish diet in the region and assess its impact on reef fish populations.

Materials and Methods

From 2015 to 2019, 71 lionfish were collected using harpoons and SCUBA diving equipment in the reefs of northern Veracruz: Lobos (21° 28' 21"N, 97° 13' 30"W), Tuxpan (21°01'44"N 97°11'42"W) and Blake (20° 45' 45"N, 96° 59' 30"W). Of the fish captured (mainly on the leeward slope), only 29 presented stomach

contents. Each of the organisms captured was measured with an ichthyometer to nearest 0.01 cm and placed in a container with ice. Stomach contents were extracted from each specimen and separated into food items for identification at the lowest possible taxonomic level, using the keys of McEachran and Fechhelm [6,7] as well as the publications of Taylor and Akins, Weaver and Rocha [8,9] for fish and Abele and Kim [10] for crustaceans. Subsequently, the relative abundance of each taxonomic group was estimated, considering the total number of individuals contained in the stomach.

Results and Discussion

The organisms analyzed presented between 11.6 and 37.0 cm of total length (22.9 ± 1.4 Mean \pm SE). Most of them were captured between 10 and 20 m in depth. The results indicate that the diet of *P. volitans* in the reefs of northern Veracruz included: crustaceans (4.8 %) and fish (95.2 %). These values coincide with the observations of Aguilar-Medrano and Vega-Cendejas [5], but not with the referred components, because it seems that the reported genera and species inhabit silty or sandy substrates. Crustaceans were represented by the families: Mysidae and Squillidae, while fish were represented by the families: Blenniidae, Gobiidae,

Labridae, Labrisomidae, Pomacentridae and Tripterygiidae, which have already been recorded by other authors in reefs of the Caribbean and Gulf of Mexico. The most frequent species in the diet of *P. volitans*, in order of relative abundance, were: *Halichoeres burekai* (24%), *Chromis scotti* (11%), *Malacoctenus triangulatus* (7%) and *Tigrigobius redimiculus* (7%). Other species identified as part of the stomach content were: *Enneanectes boehlkei*, *Ophioblennius maclurei*, *Stegastes planifrons* and *Thalassoma bifasciatum*.

All species consumed by lionfish in the reefs of northern Veracruz live on the substrate (e.g. *M. triangulatus*) or on top of colonies or coral structures (e.g. *C. scotti*). Among the species consumed by the lionfish in the region are *H. burekai* (endemic to the Gulf of Mexico) and *T. redimiculus* (endemic to Veracruz), which are added to the list of species consumed by *P. volitans*. This confirms the suspicions of Rocha et al [1] and González-Gándara [11] about the threat posed by lionfish to these two species. In some cases, 100% of the stomach contents of the lionfish corresponded to *H. burekai*, which is explained by both the distribution of this species on the reef and its abundance, as it is one of the most abundant on the reefs of the southwestern Gulf of Mexico [12,13]. The information in this paper reveals that the increase in lionfish density in the reefs of northern Veracruz may represent a threat to the regional endemic species. Therefore, assessments of lionfish abundance are necessary to generate control measures and mitigate the effect on native species. If control measures are not established, endemic species as well as small substrate-linked fishes (Tripterygiidae, Labrisomidae, Gobiidae) may decrease their population density.

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