

**SOME BIOLOGICAL ASPECTS AND ENVIRONMENTAL
IMPACT ON THE OCTOPUS POPULATION
(CEPHALOPODA: OCTOPODIDAE) IN THE GULF
OF SUEZ – NORTHERN RED SEA, EGYPT**

Submitted By

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B.Sc. of Agricultural Sciences (Fish Production), Faculty of Agriculture,
Al-Azhar University, 2005

M.Sc. of Animal Production (Fish Production), Faculty of Agriculture,
Al-Azhar University, 2011

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Doctor of Philosophy Degree
In
Environmental Sciences

Department of Environmental Agricultural Sciences
Institute of Environmental Studies and Research
Ain Shams University

2020

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Abstract

During the last years, the price of Octopuses in the national and international markets increased spectacularly. Due to the high demand and the attractive selling price of Octopus, most of fishermen reach to overfish. The present study aimed to give information about biological characters of *Amphioctopus aegina* and *A. membranaceus* as well as its population parameters (species composition, morphometric relationships, reproduction, age and growth, and population structure). This information's would help in Suez Gulf management purpose to maintain the stock of this valuable resource.

In the present study, the fishing effort fluctuated greatly from season to another between a minimum value of 1118 landings during the fishing season 2012/2013 and a maximum value of 1852 landings during 2019/2020 with an average value of 1592 landings throughout the eight years.

The species composition of Octopus caught from the Gulf of Suez were comprised to four species; *Amphioctopus aegina*, *Amphioctopus membranaceus*, *Octopus cyanea* and *Macrotritopus defilippi*, (Fig. 9). *A. aegina* and *A. membranaceus* were by far the most abundant among Octopus catch in the Gulf of Suez, constituting more than 91% of the catch.

All morphometric relationships for growth have a negative allometric growth, except those of DML with LAL, TL and SAL which were positive allometric growth for males and females for both *A. aegina* and *A. membranaceus*.

The sex ratio (M: F) were 1: 1.03 and 1: 1.46 for *A. aegina* and *A. membranaceus*, respectively. Five maturity stages for both sexes of *A. aegina*, four maturity stages for males and five maturity stages for females of *A. membranaceus* were recorded. Two peak of spawning has been recorded, the first occurred in March-April and the second spawning was in September-October for both species. Length at first sexual maturity (L_m) of *A. aegina* was 6.4 and 7.0 cm DML for males and females, respectively. For *A. membranaceus* it was 3.7 and 3.9 cm DML for males and females, respectively.

Ageing of *A. aegina* and *A. membranaceus* revealed three different age groups, and the main bulk of the catch was represented in the second age group for the two species. Von Bertalanffy growth constants were determined as; $L_\infty = 11.76$ cm DML, $K = 0.39 \text{ year}^{-1}$, $t_0 = 0.11 \text{ year}^{-1}$ and $\emptyset = 1.73$ for *A. aegina*, and $L_\infty = 11.47$ cm DML, $K = 0.45 \text{ year}^{-1}$, $t_0 = 0.33 \text{ year}^{-1}$ and $\emptyset = 1.77$ for *A. membranaceus*. The total mortality (Z), natural mortality (M), fishing mortality (F) and exploitation rate (E) were calculated as 2.87, 1.17, 1.70 and 0.59 year^{-1} , respectively for *A. aegina*, and 2.70, 1.29, 1.41 and 0.52 year^{-1} , respectively for *A. membranaceus*. The length at recruitment (L_r) of *A. aegina* and *A. membranaceus* was 1.9 and 2.4 cm DML, that corresponding to age (t_r) of 0.56 and 0.85 year, respectively. Length at first capture (L_c) was 6.28 and 4.05 cm DML for *A. aegina* and *A. membranaceus*, respectively, and the age at the first capture (t_c) was 2.07 and 1.46 years, respectively.

This work is very important for fisheries management in the Gulf of Suez, where, gives us satisfactory information of the current situation for Octopus stock with some recommendations to reduce the exploitation rates for some Octopus species.

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