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

Department of Environmental Agricultural Sciences
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APPROVAL SHEET

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Acknowledgement

First and foremost, all thanks for my God Allah, for His generosity and countless blessings that have made me who I am today and for giving me the strength to continue and achieve this work.

I am indebted with hearty thanks are due to Prof. Dr. ***Azza A. El-Ganainy****, Professor of Fisheries Biology and Head of Fisheries Division at the National Institute of Oceanography and Fisheries (NIOF), Egypt, for supervising the present work, her advice and assistance during the study, her constructive criticism and suggesting important improvements on the manuscript by which I became more expert.*

I warmly owe a real debt gratitude to Prof. Dr. ***Mohamed F. Osman****, Professor of Fish Nutrition, Faculty of Agriculture, Ain Shams University, for his moral support, continuous encouragement to perform this work, revision and fruitful discussion of the manuscript, following it up during all its phases and I am asking Allah to support him with health. Sincere respects and endless sincere gratitude are offered to Prof. Dr.* ***Magdy T. Khalil,*** *Professor of Aquatic Ecology, Faculty of Science, Ain Shams University, for his timeless efforts in helping, guidance and faithful advises.*

I would like to acknowledge staff members of Fisheries Biology laboratory and all my colleagues in the National Institute of Oceanography and Fisheries (NIOF), Suez Branch, for their friendly

assistance during this work, especially Dr. Mahmoud A. Saber, for their valuable cooperation, and also, Dr. Ezzat M. AbdAllah, from Al-Azhar University (Assiut), for his generous co-operations.

Indebtedness is due to the Science and Technology Development Fund (STDF) for sponsoring this work through the research project number 5628 entitled "Stock Assessment and Gear Description of the Red Sea and Gulf of Suez Fisheries for the Proper Management".

Finally, I feel the deepest sense of gratitude for my family and all my friends who formed part of my vision.

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_∞= 11.76 cm DML, K= 0.39 year^{-1}, t_0= 0.11 year^{-1} and Ø= 1.73 for *A. aegina*, and L_∞= 11.47 cm DML, K= 0.45 year^{-1}, t_0= 0.33 year^{-1} and Ø= 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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