IMPACT OF POLLUTED WATER ON SOME BIOLOGICAL ASPECTS OF THE NILE TILAPIA, *OREOCHROMIS NILOTICUS*-CASE STUDY ON A FISH FARM AT EL-ABBASSA, SHARKIA GOVERNORATE.

By

Mohamed Yahya Mohamed Ali

B. Sc. Zoology-chemistry (1992)

Faculty of Science - Zagazig University

A Thesis Submitted In Partial Fulfillment
of
The Requirements for Master Degree
In
Environmental Science

Department of Basic Sciences

Institute of Environmental Studies and Research

Ain Shams University

2010

APPROVAL SHEET

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تأثير الملوثات البيئية على بعض النواحي البيولوجية لسمكة البلطي النيلي اوريوكروميس نيلوتيكس
دراسة حالة للمزرعة السمكية بالعباسة - شرقية

رسالة مقدمة من

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صفحة الموافقة على الرسالة

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ختم الإجازة

اجيزت الرسالة بتاريخ / /٢٠١٠

موافقة مجلس المعهد	**موافقة الجامعة**
/ /٢٠١٠	**/ /٢٠١٠**

Acknowledgment

First of all, my thankfulness is to ***ALLAH***, who gave me the power to perform this work.

It is a pleasure to express my sincere gratitude and thankfulness to Prof. Abdel- Halim Abdou Saad, Professor of Aquatic Ecology, Zoology Department, Faculty of Science, Ain Shams University, who faithfully helped me in finishing this thesis. I will never forget his kind supervision and endless help through the whole study.

No word can express my everlasting obligation to Prof. El-Sayed Fikri Ali El-Dawi, Professor of Fish Biology, Zoology Department, Faculty of Science, Ain Shams University, for suggesting, supervising and planning this work. I am very much grateful for his noble characters, generous help and fatherly attitude.

My deepest appreciation is to Dr. Mohamed Hamdy Hssan Ali, Rearcher of Inorganic Chemistry, Fish research station, El-Kanater El-Khayria, National Institute of Oceanography and Fishers, who paid much of his valuable time and effort to supervise this work and for his unlimited help through the years of the study.

ABSTRACT

The impact of physico-chemical parameters of three types of water (fresh, underground and drainage) on the reproductive efficiency, length-weight relationship and hepatosomatic index; (HSI), of the Nile tilapia "***Oreochromis niloticus***" were studied monthly in El-Abbassa Fish Farm, Sharkia Governorate Egypt during 2009. Three aerated concrete ponds (4×4×1m) with water volume of about 16 m^3 each were used for rearing the Nile tilapia (***O. niloticus***). The first pond was supplied by fresh water and the second with underground water, whereas the third was supplied by drainage water. Ponds were stocked with healthy fingerlings collected from El-Abbassa Fish Hatchery, with mean weight 30-40g, and mean total length 10-12 cm., at a rate of 20 fish/m^3. For assessing the impact of the three different water quality on the reproductive performance of fish.

Three experimental groups of six glass aquaria for each were designed (50×70×250cm, with capacity of 100 L of water). The first, second and third groups received fresh, underground and drainage water, respectively. Whenever some fish reached maturity stage starting from April, they were transformed from the concret ponds outdoor to the glass aquaria indoor at a sex ratio of (3♀:1♂).

The physical parameters included temperature, TDS and TSS while the chemical parameters as pH, dissolved oxygen, chlorosity, alkalinity, nitrate, nitrite, ammonia, phosphate, major anions and cations were investigated. Some heavy metals (Fe, Mn, Zn, Cu, Cd and Pb were detected in the three types of water. The present study deals with a comprehensive investigation on the length-weight analysis, hepatosomatic index (**HSI**), reproductive efficiency as Ganado-somatic index **(GSI),** fecundity and histological examination of gonads. The result revealed that, drainage water was more polluted than the other two types of water due to increased levels of ammonia (0.814mg/l), nitrate (0.283 mg/l) and iron (0.385mg/l) than the permissible levels. On the other hand, the underground water was characterized by elevation of its total dissolved solids (811.4 mg/l), total suspended solids (118.1mg/l) and iron (0.538mg/l), as well as decreases of dissolved oxygen (2.9 mg/l).

On the other hand, the present results showed that the b value of the length-weight relationship of the investigated fish in the

underground water (b=1.4924) was less than that for fish from fresh and drainage waters, (b=1.5226, 1.6100, respectively).

From GSI, it was found that the breeding period of females extended from June to September. The recorded GSI for ***O.niloticus*** in fresh underground and drainage waters were low (2.38, 2.23, 2.21٪ respectively) during the pre-spawning period (March) and high (6.23, 4.87, 4.64٪) during the protracted breeding period (June).

The mean monthly values of HSI for both sexes of ***O.niloticus*** indicated that the highest values were recorded in March (1.75, 1.34 and 1.35) and the lowest once were in September (0.51, 0.33 and 0.34) for fresh, underground and drainage waters, respectively.

The range of absolute fecundity of females ***O.niloticus*** was (416-727, 227-487 and 205-509 eggs /female) in fresh, underground and drainage waters, respectively.

The monthly distribution of maturity stages was studied. The macro and microscopic examination for the gonads of ***O.niloticus*** indicated that adult females had 6 stages of gonadal development (resting, early maturing, advanced maturing, mature, ripe and spent phase). Also, the maturity stages of males were four (resting, maturing, mature and spent phase).

The histopathological changes in gonads (ovary & testis) of ***O.niloticus*** due to their exposure to different pollutants in fresh, underground and drainage waters were studied. It was found that fish exposed to higher concentrations of pollutants showed higher incidence of gonadal abnormalities in the form of deformed oocyte and spermatocyte with the reduction in their numbers and lack of active oogensis and spermatogenesis.

It was obvious from the present study that underground and drainage waters were appropriate for fish rearing and spawning after treatment but fresh water was٪ the most suitable water.

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