EFFECTS OF ENVIRONMENTAL POLLUTANTS ON REPRODUCTIVE PERFORMANCE OF FARMED FISH

By

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ABSTRACT

Kareem Mohamed Ahmed Ahmed: Effects of Environmental Pollutants on Reproductive Performance of Farmed Fish. Unpublished Ph.D. Thesis, Department of Animal Production, Faculty of Agriculture, Ain Shams University, 2015.

The testis-ova or ovo-testis is the presence of female germ cells, or oocytes, within male gonads, it has been used as biomarker for detecting xenoestrogens exposure.

Two screening experiments in 2011 and 2012 were performed to detect signs of estrogenic compounds on male Nile tilapia *O. niloticus* fish inhabit Lake Manzala. Experimental samples were collected from five drainage endpoints areas 1) El-Bashtir, 2) El-Gamil, 3) El-Inaniya, 4) El-Sirw, and 5) El-Temsah where water was contaminated with different mixture of industrial, domestic and agriculture pollutants. In addition, Nile tilapia males were exposed to three different concentrations of estrogen like compound nonylphenol ethoxylate as a laboratory experiment. The contamination dosages of nonylphenol ethoxylate (NPE) were 25, 50 and 100 µg/l administrated for 126 days in rearing tanks, to be comparable with the data obtained from the above-mentioned locations. Eighteen to twenty wild male samples were dissected; both gonads and liver were taken the GSI and HSI was calculated and processed for histological examination.

The presence of oocytes within the testicular tissue was explicit; hence, severity index (0-4) was developed based on the number of oocytes per testicular tissue section. The number of histological section examined to clearly detect intersex in tilapia was 4-6 section per fish during the two sampling seasons; likewise, were done for the lab experiment. From each histological section, three microscopic fields were examined to determine the developmental stage in each fish; and 100% of the three sections were examined for the presence of tests-ova.

In the survey part, staging males gonads showed stages II Early spermatogenesis to stage IV Late spermatogenesis of normal histological development of the testes. Testes-ova (To) were found in all collection sites and most collected samples in both seasons with different occurrence percentage and severity. Although, females showed seasonal differences in the first season; stage (VI) spent of normal histological development of the ovaries appeared to be the common stage with almost 100% of the collected samples. Stages (III) cortical alveoli formation to stage (V) Ripe, where detected in the second season with almost all cases. A few atretic oocytes were found in both seasons due to seasonal differences and the multi-cyclic reproductive pattern of tilapia. In lab experiment, the percentages of testis-ova calculated from individuals of the experiment were 10, 28 and 50% for the treated groups 25, 50 and 100 μgl^{-1}, respectively. Furthermore, severity on all examined samples in the lab experiment were minimal to mild (1-3 testis-ova/section). Where, overall severity was mild for 25 μgl^{-1} group and minimal for 50 and 100 μgl^{-1} groups.

Key words: Xenoestrogens, Lake Manzala, Testis-ova, Endocrine disrupting chemicals, *O. niloticus*, Nonylphenol ethoxylate.

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LIST OF ABBREVIATIONS

Symbol	Meaning
&	And
º	Degree
/	Per
µ	Micron
µg	Microgram
$^{-1}$	Per
am	ante meridiem
Avg	Average
C	Celsius
d	Day
DO	Dissolved oxygen
EDCs	Endocrine-disrupting chemicals
EEAA	Egyptian Environmental Affairs Agency
EPA	Environmental Protection Agency
EPO	Early perinculeolar oocyte
Fig.	Figure
FSH	Follicle stimulating hormone
g	Gram
GAFRD	General Authority for fish resources development
GnRH	Gonadotrophic releasing hormone
GSI	Gonadosomatic index
GTH	Gonadotropin
GTHI	FSH
GTHII	LH
H&E	Hematoxylin and eosin
Hp	Horse power
HSI	Hepatosomatic index
Kg	Kilogram(s)

l	Liter (s)
L	Length
LH	Luteinizing hormone
PO	perinculeolar oocyte
M	Month
m	Meter
m^2	Squared meter
m^3	Cubic meter
mg	Milligram
mm^2	Square millimeter
NH_3	Unionized ammonia
NH_4	Ionized ammonia
NO_3	Nitrate-Nitrogen
NPE or NP_9	Nonylphenolethoxylate
OAG	Office of the Auditor General of Canada
OCPs	Organochlorine pesticides
OSPAR	The Convention for the Protection of the marine Environment of the North-East Atlantic
PAHs	Polyaromatic compounds
PCBs	Polychlorinated biphenyls
pH	Hydrogen ions concentration
Pm	Post meridiem.
PPb	Part per billion
Spp.	Species
TO	Testes-ova
VTG	Vitellogenin
WHO	World health organization
WWF	World Wildlife Fund
YVO	Yolk vesicle oocyte
ZRP	Zona radiate protein