

Chapter 5

Conclusions and Recommendations

5.1 Conclusions

5.1.1 Acute toxicity

Neem *A. indica* seed extract produced an acute toxic effect on Nile tilapia *O. niloticus* with the LC_{50} of 47.71, 40.71, 38.92 and 36.25 ppm after 24, 28, 72 and 96 hours of exposure, respectively.

5.1.2 Basic histology of Nile tilapia ovary

Ovarian tissue of Nile tilapia consisted of various stages of oocyte development including the small size, *chromatin nucleolar stage* and *perinucleolar stage*; the medium size, *cortical alveolar stage* and *vitellogenic stage* with yolk granules incorporation; the large size, *ripe stage* which indicates maturation and imminent spawning. Postovulatory follicle, *corpora lutea* is seen after 5 months of experiment.

5.1.3 Subchronic toxicity

After subchronic exposure of 25.07 ppm of the neem seed extract, the effects on female reproductive system of *O. niloticus* were indicated.

Effects on female fecundity was indicated by the lower GSI and oocyte number in the treated fish from every months of experiment. Significant difference ($p < 0.05$) of GSI was detected on the 6th month. The total number of oocytes in the ovary of the treated fish were significantly different ($p < 0.05$) from the controls on the 4th and 7th

month. Reproductive failure in the fish exposed to the neem seed extract was obviously seen when the number of ripe oocyte were compared. There were significant differences ($p \leq 0.05$) in all experimental period. These effects indicate that the process of ovarian development and spawning of treated female tilapia are disturbed.

Histological changes in ovarian tissue of the treated fish were observed including the decrease in number of mature oocyte, yolk deposition both intraoocytic and extraoocytic area and adipose tissues. Histopathological events observed on oocyte in ovary of the treated fish were hyperbasophilic of the oocyte with shrunken cytoplasmic borders and degeneration of follicular cells in the chromatin nucleolar and perinucleolar stage. Oocytes in all stages of the treated fish were found abnormal in shape. Large, empty interfollicular spaces were presented and inflammation in interstitial tissues and ovarian capsules were also noted as histopathological lesions. All these events imply that the disturbance in the process of ovarian development of the neem treated fish is occurred.

5.2 Recommendations

1. Sexual maturation and development of fish is also influenced from other parameters such as season, holding space, holding conditions and capture. The age of maturation and developmental process of ovary in the experiment condition might be unable to represent that of natural environment and should be carefully interpreted.
2. The difficulties in sectioning vitellogenic oocytes should be accounted for consideration. To reduce vitellogenic loss and distortion of oocytes (which is important for morphometry and histological study), proper embedding medium and semithin sectioning are recommended.

3. In order to assure subchronic effects of neem seed extract on female reproductive system, further studies on sex hormones involved in the process of ovarian development and vitellogenesis should be in concern.



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