VI. SUMMARY AND CONCLUSION

The present work aims to investigate the response of the grass carp *(Ctenopharyngodon idella)* to the effect of carbamate insecticide" Sevin ",such effect on the tissues blood forming elements and cytogenetic were examined .

Sevin (1 - naphthyl N- methyl carbamate) was used at a predetermined sublethal concentrations of 10 and 13mg/ L. Healthy grass carp of nearly the same age with a body weight ranging 15- 20 grams were examined .

Thirty fishes were alloted three groups - two groups were treated with 10 and 13 mg/L Sevin and the third was considered as control , each group comprised 10 fishes : 5 of which were used for histological and histochemical studies and 5 were used for cytogenetic preparations .

Kidneys and liver were taken after sacrificing the fish and processed for histological , histochemical , quantitative histochemical and cytogenetic study .

The mitotic index of cells from the kidney and liver was used as an indicator for the highest population of hematopoietic tissue . The kidney has proved to be the site of most mitotic activity,therefore it was chosen for cytogenetic studies .

Histological examination of the liver revealed the following changes in treated fish as compared to control :

- Collapse of blood vessels .
- The nuclei of the treated hepatocytes became irregular with signs of pyknosis or karyolysis .
- The hepatocyte nucleolei became less conspicuous .
- The hepatocytes appear in different stages of degeneration , swelling and vacuolation .
- The kupffer cells decreased in number and its nuclei appeared fainter and ellipsoid.
- The DNA content per nucleus decreased in the treated fish .
- The cytoplasmic RNA content increased in the treated fish .

Histological examination of the kidney indicated the presence of two types of cells in wall of convoluted tubules . The tubules were surrounded by sinusoids . It showed the following changes in treated fish as compared to control :

- The glomerular capsule and its tuft shrinked in treated fish .
-The space between Bowman's capsule and its tuft has become larger .
- The diameter of the distal and the proximal convoluted segments lumen were decreased and signs of cytolysis appear in some cells.
- The intertubular sinusoids appeared highly dilated .
- The haemopoietic cells were largely decreased in number occupying much less space as compared to control.
- The nuclear DNA content was decreased in all cells of the kidney.
- The cytoplasmic RNA content of the all kidney cells was increased .

The diploid chromosome number and the fundamental number were 2n= 48 and (FN) = 96 respectively .

In the present investigation , the chromosomes of the grass carp can be arranged in three groups :

Group "A"has 5 pairs of metacentric chromosomes (3,4,8,15,and 22).

Group "B"has 9 pairs of submetacentric chromosomes (5,7 11,12 ,16 17,18,21 and 24).

Group "C" has 10 pairs of telocentric chromosomes (1,2,6,9,10,13,14,19,20 and 23).

Various chromosomal aberrations were observed in the kidney cells of fish treated with 10 and 13 mg /L Sevin . These aberrations involve both structural and numerical types . Structural aberrations included chromatid gaps ,breaks , deletion exchanges and chromatid fragmentations . The mean values for chromosomes showing structural aberrations per 50 metaphase for each was significantly higher for both 10 and 13 mg /L Sevin treatment when compared with the control. Stickiness was included as one of the numerical aberrations . The mean value for chromosomes showing chromatid stickiness per 100 metaphase spreads was significanlty higher in both 10 and 13 mg /L treatment groups than the control.

The nuclear DNA content was decreased in treated fish while cellular RNA content was increased .As RNA is essential for protein synthesis, its increase is possibly an indicator for increasing the protein synthetic activity. The observed decrease in cellular DNA content under the effect of Sevin , however, is supported by the appearance of high percentage of chromosomes undergoing fragmentation.Pulverization and fragmentation are expected to occur due to interference with some of the enzymes necessary for DNA

replication. Deletions may result from the above mechanism but, however,at a lower effect of Sevin.

In conclusion, it has to be emphasized that the use of these insecticide is very dangerous and its application in agriculture should be under very tight control.