



## TISSUE BIOACCUMULATION OF INSECTICIDES AND PLASMA CORTISOL IN THE CATFISHES DURING NON-BREEDING SEASON FROM NORTH INDIA

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### **Introduction:**

Pesticide residues in wild captured fish have been reported by workers [1,2]. Cortisol in fish has been identified as a metabolic hormone. Since pesticides cause reproductive and metabolic dysfunctions, it is necessary to monitor the tissue bioaccumulation of HCHs and plasma levels of cortisol in some edible catfishes of the un-polluted ponds of Gujartal, Jaunpur (considered as reference site) and the polluted rivers, the Gomti and Ganga during non-breeding season. The objective of this study was to compare the insecticide bioaccumulations in brain, liver and abdominal muscles, and plasma levels of cortisol as stress hormone during non-breeding season. Taking the above facts into account the persistence of chemicals like organochlorine insecticides (OCs) in these rivers, and their eventual incorporation in the food chain finally to humans are necessitated. It is imperative to monitor the presence of residues of toxic chemicals and stress hormone owing to contaminants in order to keep wild fish species in the riverine resources edible for human beings.

### **Methods:**

For the comparative study of HCHs in brain, liver and abdominal muscles and plasma cortisol levels were collected from the captured catfishes of reference site (*Rita rita* and *Bagarius bagarius*) and polluted rivers the Gomti (*Rita rita* and *Bagarius bagarius*) and the Ganga (*Rita rita* and *Clupisoma garua*) during non-breeding season in order to assess the status of pollutants causing stress. In all thirty fish were used in this study from all sites. Blood was taken by caudal vein in separate heparinized culture tubes for pesticide residue and hormone assay. The method of extraction was used with little modification as have been described earlier [3].

### **Results and Discussion:**

The bioaccumulation of  $\sum$ HCH was higher in the catfish captured from the river Gomti than the other catfishes captured from the river Ganga indicating that the Gomti is more highly polluted than the Ganga in relation to HCHs pollution. It is suggested that among catfishes there are degrees of pesticide bioaccumulation of HCHs depending upon habit and habitat of the fish. The catfish which were captured from the bottom of the

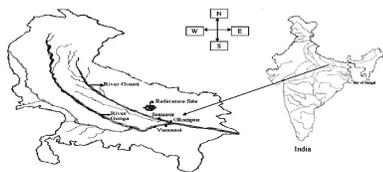
rivers showed high degree of bioaccumulation than the catfish which are not found at bottom of the river. The reason may be due to higher levels of presence of pesticide and water flow is less than the surface water. The findings of the present investigations showing bioaccumulation of HCH in catfishes of the Gomti and the Ganga support the above observations. It is also suggested that these pollutants which caused reproductive dysfunctions through disruption of gonadal steroidogenesis [3], might also have similar effect on the stress response through disruption of interrenal steroidogenesis.

### **Conclusion:**

The catfishes of the Ganga have higher  $\sum$ HCH, indicating both the rivers are highly polluted as compared to the reference site. The plasma level of cortisol was suppressed more in the catfishes captured from the river Ganga than the fishes of the river Gomti affecting the growth of the fishes. It is suggested that fish containing pesticide residues beyond the permissible limit must be avoided as food by human beings because it causes health as well as reproductive problems. It is also imperative to monitor insecticide pollution level in both Gomti and Gangetic ecosystem. Such measures would minimize their use in the catchment areas and protect the riverine fishes from the adverse impact of insecticidal pollution on their growth and reproduction.

### **References:**

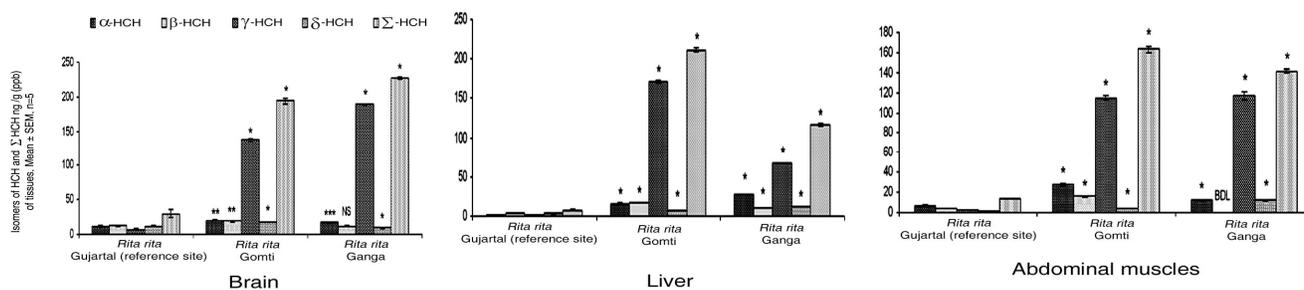
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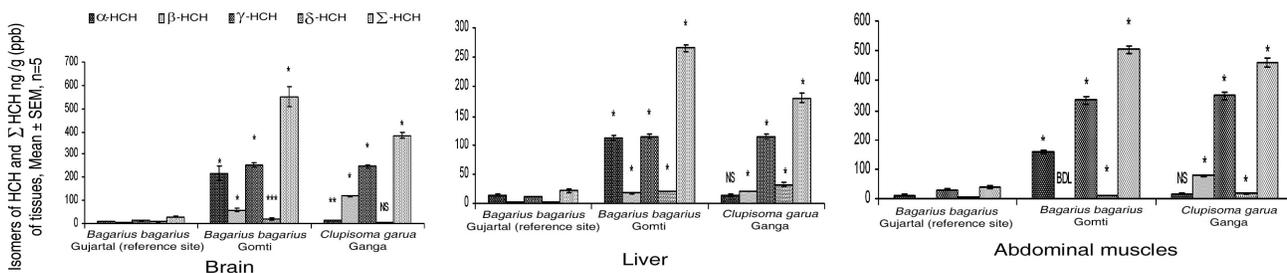
**Fig. 1.** Map showing sampling sites of unpolluted ponds of Gujartal, Jaunpur (reference site) and polluted rivers (Gomti and Ganga) of north India.

1. Gujartal, Jaunpur : Reference site (Lat. 25.46 N : Long. 82.44 E), captured catfishes [*Rita rita* (Ham.) common name Belgagra and *Bagarius bagarius* (Ham.) common name gonch]
2. River Gomti, Jaunpur : Lat. 25.46 N : Long. 82.44 E, captured catfishes (*Rita rita* and *Bagarius bagarius*)

**Fig. 2.** Comparison of isomers of HCH in brain, liver and abdominal muscles of captured catfish between reference site and polluted rivers Gomti and Ganga during non-breeding season.  $\sum HCH = \alpha + \beta + \gamma + \delta$  isomers of HCH. BDL-below detection limit. Results of isomers of HCH of fish tissues from reference site versus fish captured from rivers Gomti and Ganga were compared by Students t-test. The level of significance (P)- \*P< 0.001; \*\*P< 0.005; \*\*\*P< 0.02; NS. NS- not significant. ANOVA (TW): tissue F-4424.67 P< 0.001; isomers of HCH F-456.52 P< 0.001; tissues x isomers of HCH F-175.61 P< 0.001.



**Fig.3.** Comparison of isomers of HCH in brain, liver and abdominal muscles of captured catfish between reference site and polluted rivers Gomti and Ganga during non-breeding season.  $\sum HCH = \alpha + \beta + \gamma + \delta$  isomers of HCH. BDL-below detection limit. Results of isomers of HCH of fish tissues from reference site versus fish captured from rivers Gomti and Ganga were compared by Students t-test. The level of significance (P)- \*P< 0.001; \*\*P< 0.005; \*\*\*P< 0.05; NS. NS- not significant. ANOVA (TW): tissue F-630.74 P< 0.001; isomers of HCH F-248.81 P< 0.001; tissues x isomers of HCH F-39.86 P< 0.001.



**Fig.4.** comparison of plasma levels of cortisol during non-breeding season in the catfish captured from the reference site (R. rita and B. bagarius) and polluted rivers Gomti, Jaunpur (R. rita and B. bagarius) and Ganga, Varanasi (R. rita and C. garua). Results were compared from non polluted fish to polluted fish by Students t-test. The level of significance (P)- \*P< 0.001. ANOVA (OW): F-655.35 P< 0.001

