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Effect of water pollutants on biochemicals of gut of some aquatic insects

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Abstract : The two important pollutants DDT and Detergent were taken; these pollutants affect and decline the Biochemicals like carbohydrate, Protein of gut of aquatic insects. The concentrations of carbohydrate were changed with the treatment of pollutant compared with controlled condition

Key words: Water pollutants, biochemicals, gut, DDT, detergent

INTRODUCTION

Some water pollutants liked DDT and Detergent, having the poisoning effects on the insects because DDT and Detergent is non-biodegradable substances, which can not be decomposed and persist in environment for long time of periods. These pollutants accumulate in the tissue of insects and alter the conformation of histology and change the concentration of biochemicals like carbohydrate, protein and enzyme.

These pollutants not only affect the aquatic insects but also other animals like fish, Human, etc in ecosystem they affect the whole food chain and food web. DDT the first of chlorinated organic insecticides was originally prepared in 1873, but it was not until 1939 that Paul Muller of Geigy Pharmaceuticals in Switzerland discovered the effectiveness of DDT as an insecticide; he was awarded the Nobel Prize in medicine and Physiology in 1948 for this discovery.

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The use of DDT increased enormously on a worldwide basis after World War II, primarily because of its effectiveness against the mosquito that spreads malaria and lice that carry typhus. The World Health Organization estimates that during the period of its use approximately 25 million lives were saved. DDT seemed to be the ideal insecticide is cheap and of relatively low toxicity to mammals (oral LD50 is 300mg/kg). However, problems related to extensive use of DDT began to appear in the late 1940s. Many species of insect developed resistance to DDT, and DDT was also discovered to have high toxicity toward fish, Update by Darl Harrison (Molecule of the Month for August 1997)

In insects, like other animals, glucose occupies a central role in carbohydrate metabolism participating in different biochemical process however, in a majority of insect's species; amount of the free glucose is quite small.

The most characteristic sugar in insect's haemolymph and other body tissue is Trehalose, a disaccharide, of glucose. It is non reducing sugar by virtue of anomeric carbon atoms of both glucose molecules are bonded in

glycosidic linkage. In haemolymph usually there is relatively low level of glucose along with higher trehalose content (Friedman, 1970; Chippendale, 1978).

It has been suggested by Mordeou *et.al* (1984) that body carbohydrate concentration in insects fluctuates, with food intake and starving condition, other available information in this regard is reported for *Anthrenus vorak* (George and Nayer 1964) *Trogoderma granarum* (Koarnavas and Nair 1969; Rao and Aggarwal 1970). *Philosoma ricini* (Plant and Moris 1972, Pant and Kumar, 1979) *Callyphora erythrocephala* (Durve 1977) *Bombyx mori* (Nandi 1979); *Tribolium estaneum* and *Tribolium confusum* (Islam and Roy 1982), *Hydrophilus olivaceous*, Srivastava, 1991) *Spherodema rusticum* (Sharma and Ehteshamuddin, 1992).

A sub lethal dose of insecticides although is a very low concentration apparently do not cause mortality of aquatic insects, crustaceans fish etc, but they cause alteration in their metabolic process including carbohydrate metabolism O'Brion(1960,1967) gave review of insecticides action of lamarrei upto 72 hours of exposure after which hypoglycaemia response were recorded, Khan(1994) reported that in *Cybister confusus*, DDT and EDTA has glycemic effects on haemolymph, fat body and ovary of both immature and mature insects preventing carbohydrate yolk deposition in ovary thus affecting ovarian maturation.

MATERIALS AND METHODS

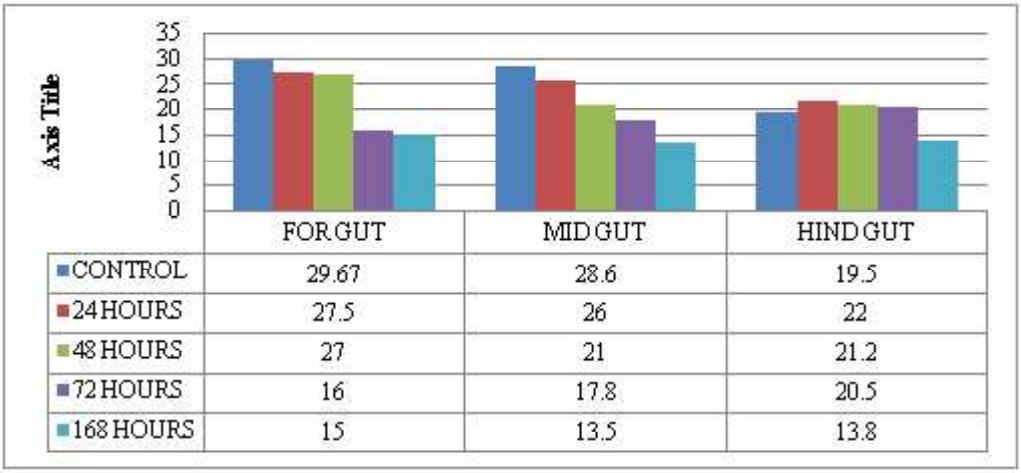
Quantitative estimation of carbohydrate of the alimentary canal of aquatic insects of both control and treated insects was done by Anthron reagent method (Carrol *et al.* 1956) which is a modified method of Roe (1955)

1. Insects were dissected in normal saline alimentary canal was taken our Fore gut, mid gut and hind gut were taken separately. Each part was homogenized in 1ml dist.water with homogenizer.
2. This homogenate was collected in centrifuge tube and was centrifuge at 3000 r.p.m in the centrifugal machine.
3. 1ml of the supernatant 4ml of 02% Anthron reagent was added and kept on hot water bath for 15minutes. Green colour developed. It was called down to room temperature.

RESULT AND DISCUSSION

In the present investigation total carbohydrate concentration in the different gut of control aquatic beetle was 29.67+4.8 S.D mg/g in the foregut, 28.6+4.5 S.D mg/g in midgut19.5+4.0 S.D mg/g in the hindgut. Both DDT and detergent treatments resulted into the gradual but significant decline in carbohydrate concentration of the mid gut, in the fore and hind gut, however the total carbohydrate concentration after DDT and Detergent treatment showed an initial rise and subsequent decline. Both detergent and DDT affect carbohydrate concentration of the gut adversely. (See graph plate)

Graph 1. Level of concentration of carbohydrate in control and DDT treated aquatic insects (water beetle)



	FOR GUT	MID GUT	HIND GUT
CONTROL	29.67	28.6	19.5
24 HOURS	27.5	26	22
48 HOURS	27	21	21.2
72 HOURS	16	17.8	20.5
168 HOURS	15	13.5	13.8

Graph 2. Level of concentration of carbohydrate in control and Detergnet treated insects (water beetle)

	FORE GUT	MID GUT	HIND GUT
CONTROL	29.67	28.6	19.5
24 HOURS	21.5	21	21.5
48 HOURS	16.4	16	20.5
72 HOURS	26.2	21.5	21.8
168 HOURS	25	19	20

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