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Toxic Effect Of Urea And Dap Fertilizer On Protein Content In Gills And Blood Of A Fresh Water Crab Barytelphusa Cunicularis (West-Wood)

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Abstract:
A fresh water crab, Barytelphusa cunicularis were exposed to different concentration of fertilizer Urea (3.5ppm) and DAP(0.25ppm) up to 96 hr exposure period. Decrease in protein content of gills and blood are same in both fertilizer but, maximum decrease was observed in DAP than Urea.

Introduction:

In present, agricultural practices require a number of synthetic fertilizers to boost the productivity. Fertilizers contain few minerals necessary for plant growth they drain in to the water through irrigation, rainfall and drainage thereby contaminating the aquatic ecosystem, which causes to disturbed the aquatic fauna and flora by contamination of toxic substances in to the aquatic system. It includes the crab, prawn, and shrimps, molluscs and fishes these are having high economic and nutritive value, but toxicity of fertilizers causes the mortality and decrease in the rate of these useful organism and also effect on human health. In recent years with increased industrial activity, wastes and toxic effluents all are normally drained in to the aquatic system have become a major source of pollution. Most of the industrial effluents carry large quantities of toxic heavy metals like mercury, cadmium, lead, zinc, Copper etc. The effect of metals may result from their binding with biologically active constituents of the body such as lipids, amino acids, enzymes and proteins. Mercury, zinc and Copper individually have been shown to have deleterious effects on the embryos and larvae of American oyster, Carss Ostrea Virginica, at low concentrations Calabrese et al. (1973).

Environmental contamination by different metals, pesticides, chemical and fertilizers are one of the major causes of pollution, which affects the life of fishes and aquatic animals in various ways an important investigation made on the biochemical changes followed by treatment of pollutants. Phillips etal. (1964); Me Katney, (1965); Yomashita, (1967); Bano etal (1981); Goel and Gupta (1985); Jana Sasadhar and Bandyopadhya, (1987); Hymavathi and Rao, (2000

Proteins are the important biochemicals involved in wide spectrum of cellular functions. They interplay key role between enzymatic and non-enzymatic proteins to govern the metabolic hormone Lehninger, (1984). They also involved in major physiological events to maintain the homeostasis of the cell. Therefore, the assessment of the protein content can be considered as diagnostic tool to determine the physiological process of the cell (Kapil and Ragothaman, 1999; Muushigeri, 2003).

As the different tissues and organs in an organism are structurally and functionally designed to carry out different physiological process, it is possible that they well have different biochemical organization. The proportion in which different constituents such as moisture, protein, carbohydrate, fat and minerals occur in organism is called its approximate composition. The approximate composition of an animal is the net effect of deposition and mobilization of organic matters.

The indiscriminate and extensive use of fertilizer causes serious threat to aquatic organism, which causes to disturbed aquatic fauna i.e. Crab, prawn, and shrimps, molluscs, sand fishes these are having high economic and nutritive value, but toxicity of fertilizers causes the mortality and decrease the rate of organic constituents.

Hence present work was undertaken to find out the effect of fertilizer Urea (3.5) ppm and DAP (0.25) ppm on protein content of gills and blood of fresh water crab, *Barytelphusa cunicularis.*

Materials And Methods:

Only healthy uniform size range between (30 to 40 gms) The fresh water male crab, *Barytelphusa cunicularis* were used for experimentation, were collected from Tq. Shirur Anantpal Dist. Latur. Obtained 50% mortality for lethal concentration of the two fertilizers were 3.5 ppm of urea and 0.25 ppm of DAP respectively. Stock solution of both the fertilizers were prepared in water and then to get required concentration of test solution, one day before animals were exposed into their respective lethal concentration and maintained in glass aquarium. Before exposure they were starved for 24 hours to eliminate nutritional effect in order to eliminate variation in composition due to differential feeding. The crabs were divided in to two groups, each group containing ten animals, one group served as control without fertilizer and other as experimental. After each 24-, 48-, 72- and 96-hours exposure time period gills and blood were taken for estimating the organic constituents. The total protein content was estimated by the method of Biuret (Chaykan, 1970).

Results:

In *Barytelphusa cunicularis* Proteins content was decreases in gills and blood, exposed to lethal concentration of fertilizers, Urea (3.5 ppm) and DAP (0.25 ppm). Same result was observed in both the fertilizers, but DAP showed maximumdecrease in protein content of gills and blood.

Protein Content:

Decrease in protein content was observed in gills and blood, in Urea and DAP solution from 24 hours to 96 hours and more decreased was observed in DAP than Urea as compare to control. Table (1) & (2).

Table (1): Effect of lethal concentration Urea and DAP On Protein content in Gills of *Barytelphusa cunicularis*
(An average of 6 observation ± S.D)

Time in hour	control	Urea	DAP
24	87 ± 0.51	51 ± 0.51	35 ± 0.51
48	81.2 ± 0.10	41± 0.40	31 ± 0.63
72	82.2 ± 0.051	35 ± 0	25 ± 0.75
96	81.1 ± 0.44	31 ± 0.75	15.5 ± 0.089

Table (2): Effect of lethal concentration Urea and DAP On Protein content: in Blood of *Barytelphusa cunicularis* (An average of 6 observation ± S.D)

Time in hour	control	Urea	DAP
24	34± 0.75	33 ± 1.04	28 ± 0.54
48	33 ± 0.51	31 ± 0.40	27 ± 0.89
72	31 ± 0.81	29 ± 0.63	25 ± 0.98
96	30 ± 0.54	25 ± 0.51	22 ± 0.51

Discussion:

The protein and amino acids maintain a ratio i.e. when protein content decreases and it is followed on exposure also. The protein content decreases as effect of fertilizers. In muscle protein content decreases in both fertilizers from 24 hours to 96 hours and maximum reduction takes places in DAP than Urea, while steep increase in Urea and greater decrease in DAP is observed. The amino acid content in muscle initially increases from 24 hours in Urea and DAP as compare to control and it decreases up to 96 hours in both fertilizer Urea and DAP. Apparently under stress of the fertilizer's carbohydrate and protein reserves and fats depleted to meet the grater energy demand. It also appears that proteins are broken down to justify the increased energy demand as reflected in increased level of total free amino acid which may be fed into (TCA) cycle as keto acids for energy production as suggested by many workers Kabeer Ahmad, etal. (1978) and Ramalingam and Ramalingam (1982). In the body of animal's sources of energy are carbohydrates, protein and fats. The depletion of carbohydrates was observed in the tissue like hepatopancreases muscles, blood and gills of the crab, *Barytelphusa cunicularis*, when exposed to Urea and DAP. Since the decrease in total protein suggested enhancement of proteolysis.

The total protein content decreased and total free amino acid content increased in the selected tissues like muscle, hepatopancreas and gills of freshwater crab, *Barytelphusa guerini* after exposure to sub lethal concentration of Hildon (Keshvan, teal., 1983; and Kamble, 1984)

Scott, et al. (1988) observed the protein synthesis was measured in ovary and hepatopancreas of intact and eye stalk ablated Adder crab. *Uca Pugilator*. A crude extract of eye stalk from the shrimp *Penaus Setiferus* inhibited ovarian sight gain in eye stalk oblate crabs. This crude eye stalk extract also inhibited in vitro protein synthesis in ovaries from intact and eye stalk-oblate crabs. A polyclonal antibody to crab vitellogenin was used to measure vitellogenin synthesis in ovaries, hepatopancreas and haemolymph in vitro. Gonad inhibiting hormone was partially purified from the crude eye stalk extract. The partially purified material inhibited vitellogenin synthesis in ovarian tissue.

Jacob Doss, et al. (2008) observed activity level of protein, free amino acid, and urea in gill, muscle, and brain, liver of Heteropenesta fossils exposed to sublethal concentration of cypermethrin for 7 days Organic Constituents / 88- and 15-days study, the result indicated a decrease in protein activity with increase in free amino acids, ammonia and urea. The decrease protein activity indicated the accumulation of cypermethrin, which results in the gradual increase in free amino acid, ammonia and urea activities.

Seker et al, (2009), observed the impact of textile dye industry effluent (IDIE)

on the nutritive value of the experimental female crab, S. Hydroma. The toxicity of the textile dye industry effluent on the crab was estimated using Lc50. The loss of nutritive value i.e. Protein, carbohydrate and lipid of the crab was studied in different tissues of crab.

Kulkami, teal. (2005) studied on impact of Hildon on biochemical constituents in the fresh water muscle, *Lamellidens Corrianus* and reported that significant decrease in total protein and total free amino acid content in foot was observed after 24, 48, 72, and 96 hours. The total protein content of hepatopancreas showed no significant decrease after 24 hours. In gills significant decrease in total protein content was observed

Keshvan et al. (2005) studied impact of Hildon on total protein content of fresh water crab, *Barytelphusa guerini* and reported that the total protein content in muscles, hepatopancreas and gill of crab were found to decrease in all sublethal concentration of Hildon and all exposure periods.

Parate and Kulkarni, (2003) reported that effect of cypermethrin also decrease total protein content in the gills and muscles of fresh water crab, *Paratelphusa Jacquinmtii*. It was due to alternative source of energy under the stress condition.

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