COMPARATIVE EFFECT OF CRUDE OIL PRODUCTS ON NITROGEN CONTENT OF *Clarias gariepinus* JUVENILES

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ABSTRACT

The comparative effect of crude oil products was investigated using Clarias gariepinus juveniles. The fish (average weight 100.20 ± 0.08g) was introduced into graded concentrations (2.00, 4.00, 6.00 and 8.00 mll $^{-1}$) of Bonny light crude oil (BLCO), premium motor spirit (PMS) Dual purpose Kerosene (DPK) in toxic phase that lasted for two hours. Nitrogen level was estimated from both serum and blood of C. gariepinus. Result showed that there was increase in nitrogen content of fish in the treated samples compared to control experiment. This may be due to the presence of the crude oil. The biological parameter investigated showed significant differences (p<0.05) when compared to the control. Increase nitrogen content suggested that there was an alteration in the water chemistry predisposing the fish to stress and disease.

Keywords: *Clarias gariepinus*, Nitrogen, Bonny light crude oil, Kerosene, Premium motor spirit

INTRODUCTION

Low survival rate in aquaculture systems of juveniles of the much cherished African catfish has been attributed to nutritional problem (Faturoti *et al.,* 1986). In addition, adults and juveniles of these fish species have been reported to be sensitive to aquatic pollutants such as cadium and crude oil (Oluah, 2001). This author reported that alterations in water chemistry usually predispose the fish to stress and disease and elicit quick physiological responses especially on the haematological parameters.

Contamination of water body by petroleum products has been shown to produce many changes in fish when either chronically or briefly exposed (Kenney *et al.,* 2002). The crude oil and its fractions when spilled have both physical and chemical effect on aquatic organisms. The physical effects are caused by oil, coating the organism or their immediate environment thus causing suffocation, loss of buoyancy and asphyxiation. Oxygen uptake in water is thus reduced due to lower dissolved oxygen concentration which may result to death.

Crude oil it products vary considerably in its toxicity and the sensitivity of fish to this products vary according to species. The water-soluble fractions of crude oil can stunt fish growth (Lopes *et al.,* 2001). Its direct mortality effect is primarily on fish eggs, larvae and early juveniles, with limited effect on the adults. The aim of this study was to determine the effect of various concentrations of crude oil and its fractions on nitrogen content of *Clarias gariepinus*, a highly priced Nigerian food fish.

MATERIALS AND METHODS

The experiment was carried out at Heldin's fishery unit, New Haven, Enugu, Nigeria. One hundred and fifty (150) juveniles of *Clarias gariepinus* (mean weight 100.2 ± 0.08 g) were transported from a private fish hatchery at Ugwuomu, Emene in Enugu State, Nigeria in 90 liter capacity plastic container to the fishery unit of the Department of Applied Biology, Faculty of Applied Natural Sciences, Enugu State University of Science and Technology, Enugu, Nigeria. Water temperature of 23 ^{0}C was maintained on transit by addition of ice cubes.

The fish juveniles were acclimatized in the plastic basin (90 litre) for 14 days and maintained on 38 % crude protein diet at 3 % body weight daily. Twenty six (26) juvenile of *C. gariepinus* were subjected to different concentrations (2.00, 4.00, 6.00 and 8 mIL^{-1}) of Bonny light crude oil (BLCO), premium motor spirit (PMS) and Dual purpose kerosene (DPK). Each of these there toxicants was introduced in duplicates (R1 and R2) in 24 plastic containers and two plastic containers served as control (without any treatment). The fish juveniles were randomly stocked in completely randomized Block Design (CRBD) in 26 plastic containers. Each container was filled to 10 litres mark with rain water and labeled according to treatment. The fish in each setup was exposed for two hours to the different concentrations of the toxicants.

Blood samples from fish juveniles exposed to different concentrations of the toxicant were collected from razor cut into the musculature behind the opercula region on the dorsal surface. The collected blood samples were allowed to cloth in order to get blood serum.

Nitrogen concentration of the blood and the serum were determined according to the method of king and king (1954). All assays were conducted spectrophotometrically at 549 nm wave length. Data collected were analyzed using the analysis of variance (ANOVA) and FLS-D to indicate statistical significance ($p>0.05$) among treatment means.

RESULTS

The values obtained for nitrogen content of *C. gariepinus* exposed to different toxicants ranged from 23.00 – 24.80 i.u/L (Table 1).

Table 1: Nitrogen contents of *Clarias gariepinus* exposed to different crude oil products

Toxicants	Concentration (ml^{-1})	Nitrogen concentration (i.u/l)		Total (i.u/l)	Mean nitrogen concentration
		RI	R2		
Kerosene (DPK)	2ml	23.50	23.30	46.80	23.40 ± 0.014^{a}
	4ml	23.60	23.50	47.10	23.50 ± 0.007^{b}
	6ml	23.50	23.30	46.80	23.40 ± 0.014^{b}
	Control	24.20	24.20	48.60	24.30 ± 0.014^{a}
Crude oil (BLCO)	2ml	23.60	23.50	47.10	23.50 ± 0.007^{b}
	4ml	23.80	23.60	47.40	23.70 ± 0.014^{b}
	6ml	23.50	23.40	46.90	23.40 ± 0.007^{b}
	Control	24.80	24.70	49.50	24.70 ± 0.00^{7a}
Petrol (PMS)	2ml	23.60	23.40	47.00	23.50 ± 0.014^{b}
	4ml	23.90	23.80	47.70	24.80 ± 0.007^{a}
	6ml	23.50	23.30	46.80	23.40 ± 0.014^{b}
	Control	24.20	24.10	48.50	24.10 ± 0.007^{a}

Table 2: Comparative effect of toxicants on the nitrogen concentration in *Clarias gariepinus* juveniles

Toxicants	Total concentration (mll^{-1})
Petrol	189.30
Kerosene	190.90
Bonny light crude oil	189.80
Control	184.00

Kerosene (190.90 i.u/L), recorded highest level of nitrogen concentration among the tested samples, seconded by Bonny light crude oil (189.80 i.u/L), while the least was recorded in petrol (189.30 i.u/L). Comparable with the control (184.00 i.u/L) (Table 2), the degree of toxicity was highest in kerosene followed by Bonny light crude oil and petrol has least toxic effect. Generally, there was significant differences ($p>0.05$) among nitrogen concentrations of fish exposed to the different products. Decreased nitrogen levels were recorded at low exposures to toxicants.

DISCUSSION

The increase in nitrogen concentrations in the treated samples may be due to the toxic effects of the toxicants. Though not all the concentrations caused increase in nitrogen concentrations, the toxic effect of the crude oil products varied according to components the fractions. There was no specific pattern of variation in the nitrogen concentration, the biological parameter investigated showed significant difference ($p>0.05$) when compared with the control and increase in the nitrogen content may be due to alteration of the protein synthesis in the blood and the immune response mechanism of the fish, this is in the line with the report of Oluah (2001). In some concentrations, there was either rapid metabolism of the products thereby reducing or terminating its toxic effect on the liver. It has been suggested that metabolism of these products will lessen their effects in fish (Oluah, 2001). On the other hand, elevation of nitrogen may be as a result of injury sustained by the fish in the liver due to its inability to metabolize the toxicant immediately.

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