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Toxicity of methanol extract of *Euphorbia Lateriflora* (Schum and Thann) to the juveniles of the African Catfish *(Clarias gariepinus)* (Teugels)

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ABSTRACT

Juveniles of *Clarias gariepinus* (mean weight 15.50 ± 01.05 and standard length 17.50 ± 00.20cm) were exposed in glass aquaria to 12.50, 15.00, 17.50, 20.00 and 22.50mgl^{-1} nominal concentration of methanoic extract of *Euphorbia lateriflora* for 96 hours (4 days) to determine the acute toxicity using static bioassay. Their opercular beats per minute, mortality and probit kill were determined. Symptoms of toxicosis observed include agitated swimming, loss of balance, air gulping, general disorientation and death. At the initial period, the opercular ventilation beats of fish exposed to the extract were significantly higher ($P<0.05$) than in control fish. At 72 and 96 hours the opercular beats in the fish were significantly higher ($P<0.05$) than in the exposed fish. The 96h-LC_{50} was determined using probit analysis was 13.18mgl^{-1}. Acute exposure of the toxicant showed altered behaviour and mortality in the

INTRODUCTION

Man has always regarded plants as one of the most valued components at our biosphere because of their uses of food, medicine, ornamentals, etc. However, their use as poisons for obtaining fish from water bodies is of serious concern because of their adverse effects on aqua- tic organisms especially fish [1,2]. Screened members of the families solanaceae, fabiacease, Rubiaceae and Euphorbiceae for molluscidal activity and found them to be potent on most snail vectors and other aquatic organisms [1].

Plants have two main classes of poisons; rotenone and saponins, which account for nearly all the ichthyo- toxic substances. The rotenone is mainly produced by leguminous plants while saponins are found in several families. Euphorbiaceae is ichthyotoxic, it is used as piscicide and it liberates cyanide in water [3]. Saponins are glycoside poison that destroys the membrane of the erythroxyte, though rarely assimilated through the diges- tive tract due to enzyme action in the gut but fish absorbs it directly through the gills into the blood stream. [4]. On the other hand, rotenone affects cold-blooded animals with no much effect on warm-blooded ones [1]. The aim of the study is to determine the acute toxicity of methanolic extract of *E. lateriflora* to *C. gariepinus,* the African mud catfish, a common freshwater fish of high demand in Nigeria.

MATERIALS AND METHODS

Experimental Fish

Healthy *Clarias gariepinus* juveniles (average weight 15.05 ± 01.05g and standard length 17.50 ± 20cm) were obtained from Maigana fish form, Zaria, Kaduna State, Nigeria. The fish were transported to the laboratory in 50L plastic jerry can with part of the top cut open and half-fill with pond water. The fish were kept in the laboratory in large water baths of 150L capacity and acclimated for two weeks prior to the experiment. During this period, the fishes were fed with pelleted diet containing 35% crude protein twice per day at 5% body weight.

Plant material

Fresh sample of *E. lateriflora* were collected from local fisherman in Samaru, Zaria, Nigeria. The plant was identified at the Department of Biological Sciences, Ahmadu Bello University, Zaria. The plant materials was kept under shade and grounded using a mill. The powder was extracted exhaustively using methanol. The crude methanol extract was hydrolyzed with dilute hydrochloric acid the hydrolase exhaustively extracted using a soxhlet extractor with chloroform. A reddish brown extract was obtained.

Bioassay

Acute 96-h static bioassays were conducted in the laboratory following the methods [5] and [6]. Pilot studies were conducted to obtain the following, 12.50, 15.00, 17.50, 20.00 and 22.50mgl^{-1} nominal concentrations of methanol extract of *E. laeriflora.* A total of 180 specimen were randomly assigned to give a loading of 10 fish per tank containing 25L of

dechlorinated municipal water. The desired methanol extract was measured and introduced in each tank except in the control tank and was allowed to stand for 30 minutes before introducing test fishes. Each of the test tanks was in triplicate with a control, which contained no toxicant. The behaviour and general conditions of the fishes were observed before, during and after each bioassay. Opercular beats and mortality at 12, 24, 48, 72 and 96 hours were recorded. Each exposed fish initially increased sharply, the increase being directly proportional ($P<0.05$) to the extract concentration (Table 2). Also, within 24 hours, the opercular beats of fish exposed to be toxicant of the were dose dependent. By 48 hours the were gradual reduction of opercular ventilation.

Percentage mortality increased with increasingly concentrations of the extract (Table 1). No mortality was recorded in the control group throughout the

Table 1: Mean of mortality records of *C. gariepinus* exposed to various concentrations of methanol extract of *E. lateriflor*a for 96 hours.

Conc. mg^{-1}	Log conc	24h	48h	72h	96h	Mortality %
Control	0	-	-	-	-	0
12.50 mg^{-1}	1.0969	-	1	3	1	50
15.00 mg^{-1}	1.1760	-	2	3	1	60
17.50 mg^{-1}	1.2430	-	3	3	1	70
20.00 mg^{-1}	1.3013	1	2	3	1	70
22.50 mg^{-1}	1.3522	5	2	1	-	80

Table 2: Mean opercular ventilation beats per minute of *clarias gariepinus* exposed to various concentrations of methanol extract of *Euphorbia lateriflora* (Schun and Thann)

Conc. (mg/l)	Log conc.	24 hr	48 hr	72 hr	96 hr
Control	0	83±0.50	84±0.50	83±0.50	83.± 0.50
12.50mg^{-1}	1.0969	106±2.50	102±0.30	90± 0.90	89.0± 1.50
15.00mg^{-1}	1.1760	126±1.50	104±0.90	93±1.50	94.0 ± 0.2
17.50mg^{-1}	1.2430	135±1.00	107±1.00	96±1.40	95.0 ±1.00
20.00mg^{-1}	1.3013	145±1.50	109±1.50	101±0.90	98.0 ±0.50
22.50mg^{-1}	1.3522	156±1.50	110±0.20	102±0.50	100 ± 1.00

were considered dead when the gill movement stopped and there was no response to gentle prodding. Dead fish were removed immediately to avoid depletion of dissolved oxygen [7]. The percentage mortality and probit kill were determined. Graph of probit kill against log concentration was used to determine the 96-h LC_{50} [8]. For the opercular beats, statistical analysis system (SAS), released 4.0 programmes was used to run analysis of variance (ANOVA) and Duncan multiple range test (DMRT) to test for differences between different levels of treatment and to separate means respectively, where applicable. Tests of significance was at 95% probability.

RESULTS

Juveniles of *C. gariepinous* exposed to methanol extract of *E. lateriflora* at higher concentrations showed agitated swimming, loss of equilibrium, respiratory distress and tonic convulsion before death occurred. At lower concentrations of 12.50 and 15.00mg l^{-1}, such changes were minimal and the control group showed no such signs. The opercular ventilation beats of the exposure period. The 96-h LC_{50} was observed to be 13.18mgl^{-1} and the computed regression equation was found to $y = 3.006X + 1.6628$.

DISCUSSION

The results of the study show that *C. garriepinus* exposed to acute concentrations of methanolic extract of *E. lateriflora* showed the following agitated swimming loss of equilibrium, respiratory distress and tonic convulsion behavioural changes. The symptoms exhibited by the experimental fish in this study are indications that mortality of the exposed fish is not only due to impaired metabolism but could in addition be due to nervous system failure. Similar findings were reported by [9, 10,11].

The frequencies of opercular ventilation beats were used as measure of respiratory rates [12]. The marked increase in respiratory rates observed within the first 24 hours as the result of their exposure to *E. lateriflora* methanolic extract suggest respiratory impairment, probably due to the hypoxic environment

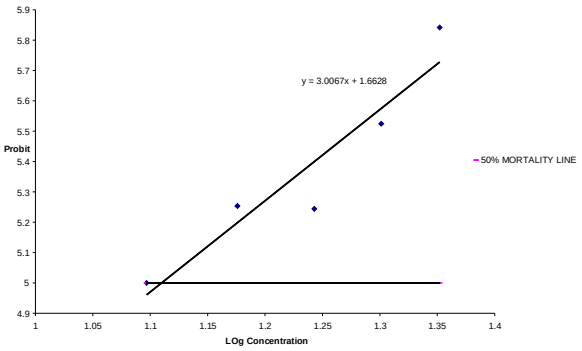

Fig. 1: LC_{50} of *Clarias gariepinus*

of the toxicant and the effect on the gill. Similar observations were made by [11] and [12].

The value of 96-h LC_{50} of 13.18mgl^{-1} reported in this work is much lower tan those earlier reported by [9] when they exposed the African fresh water catfish, *Clarias garipinus* to water extracts of sausage plant, *Kigelia African* (Lodd) and Akee apple *Blighia sapida.* Similarly, these values were lower than those reported by [11] when they exposed *C. gariepinus* to water milk extract of *Thevetia peruviana.* The implication of these findings is that methanol extract of *E. lateriflora* is more toxic than those of *Kigelia Africana, Blighia saphida* and *Thevetia peruviana* hence lower concentrations of *E. lateriflora* resulted to mortality than the other extracts.

The acute concentration of *E. lateriflora* is harmful to *C. gariepinus*, a major fresh water fish of high economic value in this country. Their usage by local fishermen for fishing should be highly discouraged or completely banned.

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