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Haematological and Histological Assessment of *Clarias gariepinus* Juveniles Exposed to Crude Extract of *Albizia Chevalier* Sawdust

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ABSTRACT: The toxicity of *Albizia chevalier* sawdust extract was investigated with emphasis on histopathological and haematological effects on African catfish (*Clarias gariepinus*) juveniles. A static bioassay was conducted to determine the LC_{50} of *Albizia chevalier* sawdust extract to *Clarias gariepinus juveniles*. The fish were exposed to 55, 63.1, 67.6, and 73.9mI/L of *Albizia chevalier* sawdust extract. The result of the acute toxicity showed that the extract was toxic to the fish with an LC_{50} value of 54.42mI/L. The pH, DO and temperature values of the water in the different concentrations differed significantly from the control ($p \leq 0.05$). Furthermore, the haematological assessment revealed that values of the blood parameters (WBC, RBC, HGB, HCT, PCV, LYM, MxM, NEUT and PLT) of fish in the different concentrations were significantly different from the control ($p<0.05$). Histopathological examinations of the gills and liver of *Clarias gariepinus* juvenile exposed to *Albizia chevalier* sawdust extract in the control showed normal gill and liver architecture. However, there were varying degrees of degenerative changes in the gills and liver of fish in different concentrations of the *Albizia chevalier* sawdust extract. The results of the study revealed that crude extract *Albizia chevalier* is toxic to fish organs and causes histopathological changes in the gills and liver and cause stress to the fish. Therefore indiscriminate discharge of sawdust by sawmills into the environment should be discouraged particularly into water bodies.

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The western part of Nigeria is blessed with forests in which most of the wood used for building houses, production of furniture, construction etc. is gotten. Pollutants in water severely impact the ability of fish to sense and respond to chemical cues. Such filthy settings may also have a negative impact on animal feeding, growth, and reproductive abilities. Mass fish mortality could occur as a result of polluting aquatic environments. The physiology and survival of aquatic creatures, such as fish, are affected by these substances, but they can also interact with their genetic material and cause mutations and/or cancer. The constant flow of sawdust powder into the freshwater has a great effect on the aquatic organisms in the water body. This can cause pollution and great damage to the organism in the water. Pollutants in water severely impact the ability of fish to sense and respond to chemical cues. Such filthy settings may also have a negative impact on animal feeding, growth, and reproductive abilities. Mass fish mortality could occur

as a result of polluting aquatic environments. The physiology and survival of aquatic creatures, such as fish, are affected by these substances, but they can also interact with their genetic material and cause mutations and/or cancer (Sabra and Mehana, 2015). In Nigeria, numerous local sawmills are functioning and processing wood. Therefore, there is a constant production of waste, sawdust, from sawmill activities. The sawdust is usually left in heaps around the sawmill and subsequently finds its way into the surrounding waters through erosion. *Clarias gariepinus* was used as a test organism in this study given that is hardy and it has a wide geographical distribution (Ariyomo *et al.*, 2017). Furthermore, this species is widely used as a biological indicator in ecotoxicological studies (Saidu *et al.,* 2007). This study sought to assess the impact of the *Albizia chevalier* sawdust extract on the African catfish juveniles, *Clarias gariepinus*, to know the effect on the blood parameters, gills and liver using haematological and histological techniques.

MATERIALS AND METHODS

A total of 200 *C. gariepinus* juveniles were bought from a reputable farm and it was transported to the fisheries wet laboratory of the Federal University Oye-Ekiti, Ekiti State. The fish were acclimatized for two weeks in a plastic tank containing fresh water. The average weight of the fish was determined. The fish were fed with a floating feed commercial feed (40% crude protein) during the acclimatization.

Albizia chevalier sawdust was collected from the Odiolowo sawmill, Ikole, Ekiti state and soaked in distilled water (500g in 1liter of distilled water) and it was allowed to stand for four days in an airtight container. The mixture was filtered using a clean white muslin cloth and squeezed thoroughly to let all the filtrate out, while the residue was discarded, the extract was used both for range finding and definitive test.

One hundred (100) juveniles of *C. gariepinus* having an average weight of 8g were used for the range-finding test. Ten (10) transparent cylindrical plastic containers of 25L capacity were used for the range-finding test. Ten fish were randomly selected into each transparent cylindrical plastic container filled with 10L of water. The containers were covered with a net to prevent the fish from jumping out and to prevent any other organisms from entering the container. The range-finding test lasted for 96 hours. Feeding was discontinued during this period to reduce the production of waste in the transparent cylindrical containers thus reducing ammonia production. The fish were exposed to varying concentrations of *Albizia chevalier* and concentrations s well as the control were duplicated. The result of the range-finding test was used to establish the concentrations used in the definitive test. One hundred juveniles of *C. gariepinus* with an average weight of 8g were used for the definitive test. From the result of the definitive test, Four varying concentrations, 55, 63.1, 67.6, and 73.9mI/L of *Albizia chevalier* sawdust extract were used. Each concentration and the control were duplicated. The four varying concentrations were introduced into the transparent cylindrical plastic containers of 25L capacity, filled with 10L of water. Ten fish were randomly selected into each transparent cylindrical plastic container and the toxicity test was done as before for 96 hours. The ranging finding and definitive tests were conducted under standard bioassay procedures (American Public Health Association, 1977).

The general behaviour of the fish was observed and monitored during the definitive test and recorded, based on each concentration, the observations made included erratic movement and hanging of fish, in higher concentrations, the fish were swimming up and gasping for air.

Mortality in each concentrate was recorded every 24 hours to determine the LC_{50} value (the concentration of crude extract of *Albizia chevalier* sawdust which will kill 50% of the test organism in 96 hours).

The hydrogen ion concentration (pH), dissolved oxygen (DO) and temperature were measured during the experiment to know the effect of *Albizia chevalier* on the water parameter.

Haematological characteristics of *Clarias gariepinus* exposed to varying concentrations of crude extract of *Albizia chevalier* sawdust were determined by collecting blood samples at the end of the experiment from the caudal vein into EDTA lithium tubes. The blood was analysed and the packed cell value (PVC) with micro haematocrit using a heparinised capillary tube (25mm), red blood cell (RBC) and white blood cell (WBC) count, Haemoglobin (HB or HGB) concentration, Hematocrit (HCT), Lymphocytes (LYM), Mixed cell percentage (MxD), Neutrophils count (NEUT) and Platelet count (PLT) were determined using various methods described by Svobodova *et al*. (1991).

Histological examination of the gill and liver was carried out by dissecting the fish to take out the organs. They were fixed in formalin for three days for preservation. Tissues were fixed in paraffin wax and left to solidify. Sectioning was done using a microtome that produced ribbons of wax containing the tissue sections. The ribbons were floated on warm water to

flatten out the sections before carefully collecting the sections onto glass slides. The slides containing the tissue sections were allowed to dry fully before staining to highlight the individual cells and tissue components. The wax was removed and the Staining was done with a mixture of haematoxylin and eosin. The slides were observed under a light microscope and the result was recorded, photographs of the stained specimens were finally taken and interpreted accordingly.

Data collected on mortality was subjected to the Probit and Logit transformation method (Finney, 1982) and the LC_{50} value was determined accordingly.

Statistical analysis of data collected on water parameters and haematological characteristics of *C. gariepinus* during the experiment were subjected to statistical analysis using SPSS (Statistical Package for Social Sciences)

RESULTS AND DISCUSSION

The physicochemical parameters of water in the experimental units within the exposure period are represented in Table 1. Temperature value within the experimental period was observed to show no significant difference ($p > 0.05$) across the different exposure levels. However, there were significant differences ($p \leq 0.05$) in the pH and dissolved oxygen within the exposure period. The pH at 24 hours of exposure was between 7.88 mg/L and 7.52mg/L. There were reductions in the pH values of the test medium as the level of *Albizia chevalier* increased. the pH recorded in the medium containing 67.6mI/L and 73.9mI/L after 48 hours of exposure to *Albizia chevalier* differed significantly ($p<0.05$). There were no significant differences ($p > 0.05$) in the water pH of the test medium with no *Albizia chevalier* and 61.30mI/L level of concentration towards the end of the experiment. Furthermore, the pH of the experimental unit after 72 hours increased from what was obtained across the experimental units after 48 hours. pH values were similar ($p>0.05$) in treatment containing 55.00mI/L 61.30 mI/L and 67.60mI/L and were significantly different from the pH values in the control and medium containing 73.9mI/L of *Albizia chevalier*. The dissolved oxygen was also observed to follow a similar trend as observed with the pH. The dissolved oxygen reduced as the level of *Albizia chevalier* increased. The dissolved oxygen value reduced from the control to (5.45mg/L) to treatment containing 73mI/L of *Albizia chevalier* (1.30 mg/L). The dissolved oxygen value of the experimental unit ranged between 5.55mg/L and 1.25 mg/L with no significant differences ($p>0.05$) in the dissolved oxygen of medium containing 61.30mI/L, 67.60mI/L and 73.90mI/L but these values were significantly different ($p < 0.05$) from dissolved oxygen of the control and medium containing 55mI/L. Equally, the dissolved oxygen of the experimental medium across the different levels of concentration showed no significant differences in the test medium containing 61.30mI/L, 67.60mI/L and 73.90mI/L but these values were significantly different ($p<0.05$) from dissolved oxygen values in the control and medium containing 55mI/L of *Albizia chevalier*. From 72 to 96 hours, the pH and dissolved oxygen values ranged from 8.19-7.93 and 5.20-0.95mg/L respectively and it was equally observed that the dissolved oxygen reduced significantly as the level of *Albizia chevalier* increased. The pH of the water after 96 hours of exposure was similar ($p>0.05$) in the test medium containing 55mI/L, 61.3mI/L and 67.60mI/L but was significantly different from those recorded in the control and medium containing 73.9mI/L of *A. chevalier*. The mortality rate and the probit value of the *C. gariepinus* exposed to acute concentrations of *A. chevalier* are presented in Table 2. Fish mortality was observed in all the experimental tanks except in the control tank. At 96 hours the mortality percentage with respect to the exposure of 55.0mI/L, 61.3mI/L, 67.60mI/L, and 73.900mI/L were 20%, 45%, 80% and 70% respectively. The result of the acute toxicity showed that the toxicant was toxic to the fish with an LC_{50} value of 54.42mI/L (Fig 1). The general behaviour of the fish was monitored during the definitive test and was recorded, based on each concentration, observation made included erratic movement and hanging of fish. The fish in control has no changes in behaviour as they express normal behaviour. However, fish exposed to 55 mI/L showed less erratic and quick movements but fish exposed to 61.3mI/L, 67.6 mI/L, and 73.9 m/l of *Albizia chevalier* were gasping for air and they were hanging inside the water. This observation shows that the crude extract of *Albizia chevalier* had a negative effect on the physicochemical parameters of the water which make the fish behave abnormally. The haematological profile of *Clarias gariepinus* juveniles exposed to different levels of *Albizia chevalier* is presented in Table 2. The white blood cell of the fish showed no significant difference ($p > 0.05$) in catfish subjected to 67.60 mI/L ($0.40 \pm 0.10 \times 10^3$ µL) and 73.9 mI/L ($0.30 \pm 0.10 \times 10^3$ µL) but were significantly different ($p<0.05$) from the white blood cell count recorded in treatment containing 61.30 mI/L (0.80 ± 0.10µL). Furthermore, the red blood cell ranged from 0.03 µL and 0.03 µL and it was observed that the RBC was not different in fish exposed to 55 mI/L ($0.22 \pm 0.01 \times 10^6$ µL), 61.30 mI/L ($0.04 \pm 0.01 \times 10^6$µL), 67.60 mI/L ($0.03 \pm 0.01 \times 10^6$µL) and 73.90 mI/L ($0.09 \pm 0.01 \times 10^6$µL).

Table 1: Physiochemical parameters of test medium exposed to different concentrations of *Albizia chevalier* extract

Hours	Parameters	Control	55ml/L	63.1 ml/L	67.6 ml/L	73.9 ml/L
24 hours	Temperature	20.50 ± 0.71^{a}	20.50 ± 0.71^{a}	20.00 ± 0.00^{a}	20.00 ± 0.00^{a}	20.50 ± 0.71^{a}
	Ph	7.88 ± 0.01^{d}	7.64 ± 0.04^{c}	7.59 ± 0.04^{bc}	7.56 ± 0.04^{ab}	7.52 ± 0.01^{a}
	Dissolved oxygen	5.45 ± 0.07^{c}	2.90 ± 0.57^{b}	2.00 ± 0.14^{a}	1.65 ± 0.21^{a}	1.30 ± 0.14^{a}
48 hours	Temperature	21.50 ± 0.71^{a}	21.50 ± 0.71^{a}	22.00 ± 0.00^{a}	22.00 ± 0.00^{a}	22.00 ± 0.00^{a}
	Ph	8.08 ± 0.00^{c}	8.10 ± 0.04^{c}	8.06 ± 0.03^{c}	7.82 ± 0.01^{b}	7.70 ± 0.02^{a}
	Dissolved oxygen	5.55 ± 0.07^{c}	2.80 ± 0.57^{b}	1.55 ± 0.07^{a}	1.65 ± 0.07^{a}	1.25 ± 0.07^{a}
72 hours	Temperature	21.00 ± 0.00^{a}	21.00 ± 0.00^{a}	21.00 ± 0.00^{a}	21.00 ± 0.00^{a}	21.00 ± 0.00^{a}
	pH	8.19 ± 0.01^{c}	8.15 ± 0.01^{bc}	8.11 ± 0.01^{bc}	8.05 ± 0.07^{b}	7.93 ± 0.08^{a}
	Dissolved oxygen	5.25 ± 0.07^{c}	2.65 ± 0.64^{b}	1.25 ± 0.07^{a}	1.35 ± 0.07^{a}	0.95 ± 0.07^{a}
96 hours	Temperature	20.50 ± 0.71^{a}	21.00 ± 0.00^{a}	20.50 ± 0.71^{a}	20.50 ± 0.71^{a}	20.50 ± 0.71^{a}
	pH	8.19 ± 0.03^{b}	8.15 ± 0.01^{b}	8.12 ± 0.01^{b}	8.11 ± 0.01^{b}	7.93 ± 0.09^{a}
	Dissolved oxygen	5.20 ± 0.14^{c}	2.50 ± 0.71^{b}	1.25 ± 0.07^{a}	1.35 ± 0.07^{a}	0.95 ± 0.21^{a}

Mean ± S.D with different superscripts across rows are significantly different at $p \leq 0.05$

The haemoglobin of *C. gariepinus* exposed to the different levels of *A. chevalier* showed no significant difference ($p>0.05$) between fish exposed to 61.30 mI/L (0.40 ± 0.01 g/dl**)** and 67.60 mI/L (0.40 ± 0.01 g/dl**)**. These were however significantly different ($p<0.05$) from the Hb of *C. gariepinus* exposed to the control, 55mI/L and 73.90mI/L of *A. chevalier*.

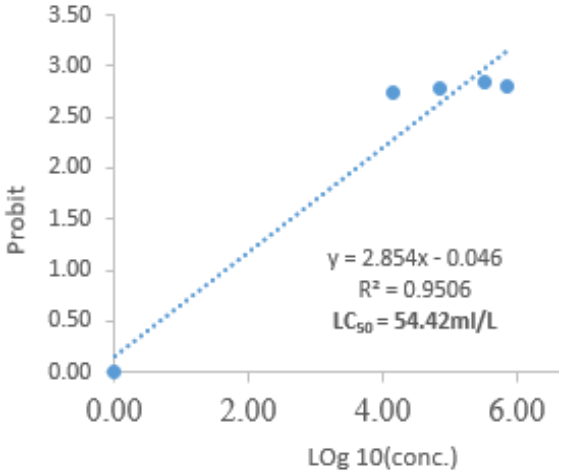

Fig 1: Probit value against log concentration of the toxicant

Hematocrit percentage of the *C. gariepinus* exposed to the different levels of *A. chevalier* was observed to show similarities ($p>0.05$) in fish exposed to 61.30mI/L (0.40 ± 0.10%) and 67.60mI/L (0.30 ± 0.10%) but were significantly different from those observed in 55mI/L (2.50 ± 0.10%), the control (1.20 ± 0.10%) and 73.90mI/L (0.00 ± 0.00%) with the highest hematocrit recorded in medium with 55mI/L (2.50%) and the least in observed in medium with 73.90mI/L of *A. chevalier*. Furthermore, the packed cell volume in *C. gariepinus* in the test medium containing 67.60mI/L (28.00 ± 0.00%), 55mI/L (26.00 ± 1.00%), 61.30mI/L (25.00 ± 0.00%) and 73.90mI/L (25.00 ± 1.00%) were not significantly different but these values were significantly different from the PCV recorded in the control (18.00%) which have the lowest PCV. Also, the blood differentials in *C. gariepinus* exposed to *A. chevalier* revealed that the lymphocyte was highest in fish exposed to 55mI/L (71.00) while the least was observed in medium with 67.60mI/L (50.00%). There were similarities ($p > 0.05$) in the lymphocyte recorded in the test medium containing 63.1 mI/L, 67.6 mI/L and 73.9 mI/L but these values were significantly different from those exposed to the control and 55mI/L of *A. chevalier*. MxD in *C. gariepinus* was not different ($p>0.05$) in the medium containing 61.30mI/L and 73.9mI/L of *A. chevalier* but was significantly different from the MxD in fish exposed to no level of 55mI/L and 67.60mI/L. The highest MxD was recorded in fish exposed to 55mI/L (9.00) and the lowest was recorded least recorded in fish exposed to 67.60mI/L of *A. chevalier*.

Table 2: Hematological profile of the fish exposed to different concentrations of *Albizia chevalier* extract

Parameters	Control	55mI/L	63.1 mI/L	67.6 mI/L	73.9 mI/L
WBC	0.70 ± 0.10^{bc}	0.60 ± 0.10^{b}	0.80 ± 0.10^{c}	0.40 ± 0.10^{a}	0.30 ± 0.10^{a}
RBC	0.63 ± 0.48^{b}	0.22 ± 0.01^{a}	0.04 ± 0.01^{a}	0.03 ± 0.01^{a}	0.09 ± 0.00^{a}
HGB	0.60 ± 0.10^{c}	1.10 ± 0.10^{d}	0.40 ± 0.10^{b}	0.40 ± 0.10^{b}	0.09 ± 0.01^{a}
HCT	1.20 ± 0.10^{c}	2.50 ± 0.10^{d}	0.40 ± 0.10^{b}	0.30 ± 0.10^{b}	0.00 ± 0.00^{a}
PCV	18.00 ± 1.00^{a}	26.00 ± 1.00^{b}	25.00 ± 0.00^{b}	28.00 ± 0.00^{c}	25.00 ± 1.00^{b}
LYM	48.00 ± 1.00^{a}	71.00 ± 1.00^{d}	50.00 ± 1.00^{b}	50.00 ± 1.00^{b}	54.00 ± 1.00^{c}
MxD	7.20 ± 1.00^{c}	9.00 ± 1.00^{d}	5.50 ± 1.00^{b}	4.20 ± 0.10^{a}	6.00 ± 1.00^{b}
NEUT	44.00 ± 1.00^{c}	20.00 ± 1.00^{a}	44.50 ± 0.10^{cd}	45.80 ± 0.10^{d}	40.00 ± 1.00^{b}
PLT	7.00 ± 1.00^{c}	1.60 ± 0.10^{b}	35.00 ± 1.00^{d}	34.00 ± 1.00^{d}	0.00 ± 0.00^{a}

Mean ± S.D with different superscripts across rows are significantly different at $p \leq 0.05$

The neutrophil was found to be significantly different ($p<0.05$) across the experimental fish exposed to the different levels of exposure with the highest recorded in the medium containing 67.60mI/L (45.80%) and the least was observed in fish exposed to 55mI/L (20.00%). Finally, the platelet of the fish exposed to the different levels of the experimental treatment was observed to be similar in fish subjected to 61.30mI/L and 67.60mI/L ($p>0.05$) but these values were significantly different from the platelet counts of fish in the control, level 55mI/L and 73.90mI/L ($p<0.05$).

Histological assessments of the gills and the liver of *C. gariepinus* exposed to varying concentrations of *A. chevalier crude* extract are shown in (Plates 1-10). Examination of the gills of fish in varying concentrations showed varying degrees of damage to the tissues. Histological structure evaluation of fish gills in the control (Plate 1) showed a normal pattern of gill filaments, normal pavement cells (red arrow) and pillar cells (yellow arrow). However the gill of fish exposed to 55mg/l of *Albizia chevalier* showed extensive curling and hypertrophy of gill lamellae (Plate 2), and the gill of fish exposed to 61.3mg/l of *Albizia chevalier* showed severe congestion of gill lamellae (Plate 3). In Plates 4 & 5, there is a normal pattern of gill filaments, but mild lifting of the respiratory epithelium (red arrow), epithelial hyperplasia, and pillar cells (yellow arrow).

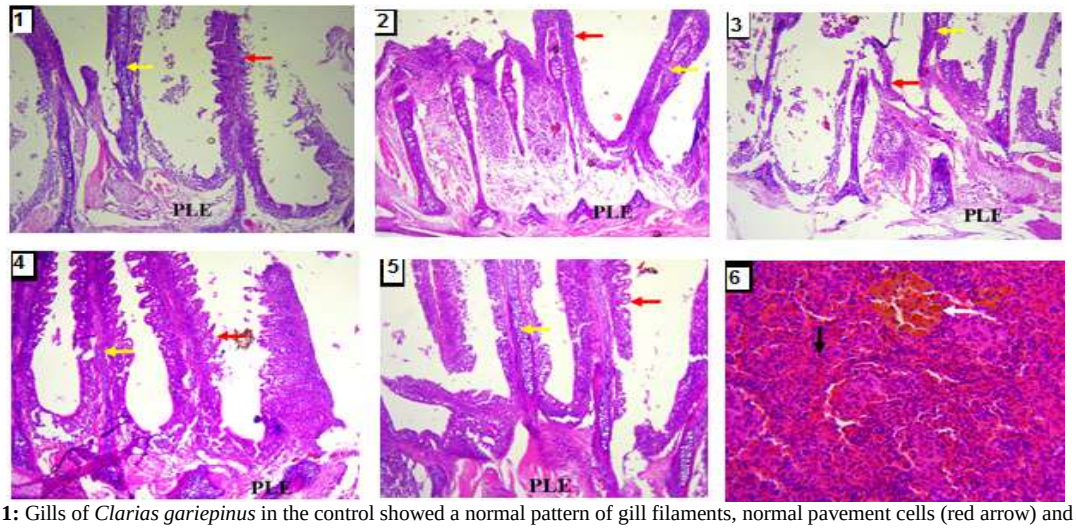

Plate 1: Gills of *Clarias gariepinus* in the control showed a normal pattern of gill filaments, normal pavement cells (red arrow) and pillar cells (yellow arrow); **Plate 2:** Gills of *Clarias gariepinus* exposed to 55mg/l of *Albizia chevalier* showed extensive curling and hypertrophy of gill lamellae; **Plate 3:** Gills of *Clarias gariepinus* exposed to 61.3mg/l of *Albizia chevalier* showed severe congestion of gill lamellae; **Plate 4:** Gills of *Clarias gariepinus* exposed to 67.6mg/l of *Albizia chevalier* showed a normal pattern of gill filaments. Hypertrophy in pavement cells (red arrow), epithelial hyperplasia, and pillar cells (yellow arrow); **Plate 5:** Gills of *Clarias gariepinus* exposed to 73.9mg/l of *Albizia chevalier* a normal pattern of gill filaments, but a mild lifting of the respiratory epithelium (red arrow). Epithelial hyperplasia, and pillar cells (yellow arrow); **Plate 6**: Histological structure of *Clarias gariepinus* liver in the control revealed normal hepatocytes (black arrow) and erythrocyte infiltration into blood sinusoids (White arrow). X 800

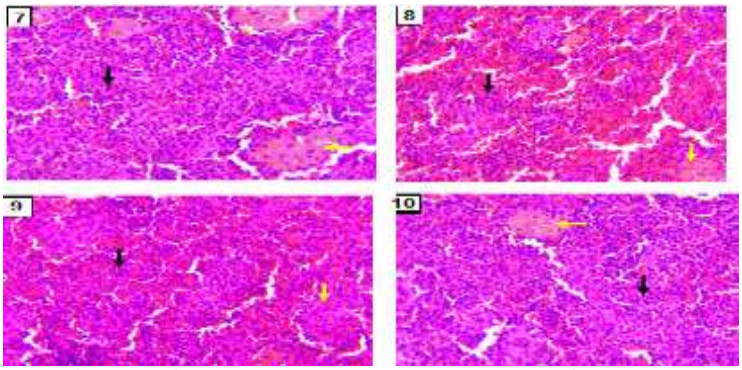

Plate 7: Histological structure of the liver of *Clarias gariepinus* liver exposed to 55mg/l of *Albizia chevalier* revealed hepatic necrosis (black arrow), and increased haemorrhage (yellow arrow); **Plate 8**: Histological structure of liver of *Clarias gariepinus* liver exposed to 61.3mg/l of *Albizia chevalier* revealed hepatic necrosis (black arrow), increased haemorrhage (yellow arrow), and infiltration of the erythrocyte; **Plate 9**: Histological structure of *Clarias gariepinus* liver exposed to 67.6mg/l of *Albizia chevalier* revealed hepatic necrosis (black arrow), mild haemorrhage (White arrow), and infiltration of the erythrocyte; **Plate 10**: Histological structure of *Clarias gariepinus* liver exposed to 73.9mg/l of *Albizia chevalier* revealed hepatic necrosis (black arrow), and increased haemorrhage (yellow arrow). X 800

The histology examination of the liver revealed normal hepatocytes (black arrow) and erythrocyte infiltration into blood sinusoids (White arrow) in control (Plate 6). However, histopathological assessment of the liver of fish exposed to 55mI/L & 61.3mI/L of *Albizia chevalier* extract revealed hepatic necrosis (black arrow), increased haemorrhage (White arrow), and infiltration of erythrocyte (Plate 7 & 8). Histopathological assessment of the liver of fish exposed to 67.6mI/L and 73.9mI/L of *Albizia chevalier* revealed hepatic necrosis (black arrow), and increased haemorrhage (White arrow) (Plates 9 & 10). The results obtained from the histology experiments indicated that *Albizia chevalier* had a direct impact on the tissues of the gills and livers of *Clarias gariepinus* Clarias gariepinus juveniles exposed to *A. chevalier* exhibited varied degrees of physical alterations, including irregular swimming, fast and sudden movement, settling down at the bottom of the plastic container, and ultimately death. However, after 96 hours, the fish in the plastic containers containing smaller amounts of the crude extract of A. chevalier saw dust showed less irregular and fast movements. The results of Okey *et al.*, (2021) and Ariyomo *et al.*, (2017), who exposed juvenile catfish to different amounts of Paraquat and cassava effluent, respectively, are consistent with these findings. The respiratory anomaly (gasping for air before death) seen in the test organism in this study is consistent with the findings of Dahunsi and Oranusi (2013) who subjected Clarias gariepinus to rubber production effluent. Fast opercula movement and bubble release may have decreased oxygen levels during the exposure period. According to Enujiugha and Nwanna (2004), a drop in oxygen levels can have a significant impact on fish life. When dissolved oxygen levels fall below a species' minimal oxygen needs, fish are put under stress, which can lead to mortality. The LC_{50} value of *Albizia chevalier extract* is 54.42mI/L, which is the concentration of *Albizia chevalier extract* that will kill 50% of the test organisms. This is pointing to what happens to fish and other organisms in a river when immeasurable effluent of *Albizia chevalier* is washed into the river. Therefore, the safe level of the crude extract of *Albizia chevalier* should be lower than 54.42mg/L. The LC_{50} value of 54.42mg/l in this study is lower than values reported by Matouke and Obadiah (2015) during the haematological and histological evaluation of *Clarias gariepinus* following acute exposure to methanolic extract of *khaya senegalensi* (199.69 mg/l) *and* aqueous extracts of *Tephrosia vogelii* (94.59 mg/l) and *Albizia gummifera* (277.82 mg/l) (Yusuf *et al*., 2022). Nonetheless, *Albizia chevalier* extract resulted in the mortality of *Clarias gariepinus* juveniles, particularly in higher concentrations. There were noticeable variations between the control and the other concentrations, as evidenced by the values of the physicochemical parameters for both the control and the other concentrations. There was no change in the temperature of control and other treatment. However, the pH increased every 24hrs, the increase in pH with time may be due to the chemical constituent of the crude extract (*Albizia chevalier*), as research has shown that various chemicals and pollutants are known to cause an imbalance in pH levels (Saalidong *et al*., 2022). However, the pH values recorded in the study were still within the acceptable range for freshwater fish culture (Mustapha, 2019). The dissolved oxygen value reduced with increasing concentrations of the extract, which subjected the fish to stress and later led to the death of the fish given that the lower the oxygen level, the greater the stress. Industrial wastes of this nature reduce dissolved oxygen because they cause oxygen demand (Bozorg-Haddad *et al*., 2021). The haematological assessment of fish blood exposed to varying concentrations of *Albizia chevalier extract* showed that there was a significant difference in the blood parameters of the fish from the control fish to fish in the highest concentration. There was a decrease in WBC and RBC as PCV increased. WBC helps fight infection, defend the body against foreign organisms, and distribute antibiotics (Isaac *et al.*, 2013), thus, animals with low WBC are exposed to a high risk of disease infection. Moreover, RBC operate as a carrier for haemoglobin; during breathing, haemoglobin combines with oxygen in the blood to generate oxyhaemoglobin; as a result, a decrease in RBC implies a decrease in the amount of oxygen delivered to the tissues, which would cause severe anaemia in fish (Isaac *et al.*, 2013). Similar findings were reported in the toxicological studies where *Clarias gariepinus* was exposed to various toxicants which led to an anaemic response in fish response to toxicants was time and dose-dependent (Akinwole and Oguntuga, 2014). The histology assessment of the fish gill varying degrees of damage to the tissues of the fish exposed to *A.chevalier*. Severe congestion of gill lamellae was particularly evident in the gills of fish in the higher concentration, this observation is in line with the study conducted by Akinwole and Oguntuga (2014) on *Clarias gariepinus* exposed to sublethal concentrations of cold water fresh root bark extracts of *Plumbago zeylanica* (Leadwort). The histology assessment of the fish liver revealed varying degrees of hepatic necrosis, increased haemorrhage and infiltration of the erythrocytes. This result is similar to the observations of Matouke and Obadiah (2015) where the histological evaluation of African catfish liver exposed to methanolic extract of *Khaya senegalensis* showed degeneration of the cytoplasm, necrosis, sinusoidal blood congestion and

marked blood congestion in hepatocytes. This study showed that *A. chevalier* sawdust altered the physicochemical parameter of water and substantially affected the tissues of the gills and the liver of *Clarias gariepinus.*

Conclusion: The study found that Albizia chevalier extract is toxic to fish and can cause damage to their gills and liver. Additionally, prolonged exposure to sawdust effluent can negatively impact the water quality, harm fish organs, and lead to high mortality or eradication of aquatic life. As a result, the discharge of sawdust into aquatic bodies by sawmills should be discouraged to prevent damage to the environment and aquatic life.

REFERENCE

Akinwole, AO; Oguntuga, OA (2014). *Department of Aquaculture and Fisheries Management, University of Ibadan, Nigeria, JFAS.* 29-35p v-9

American Public Health Association (1977). American Water Works Association Pollution Control Federation; Standard methods for the examination of water and wastewater. Washington D. C. APHA. 1193p, 14th (Ed)

Ariyomo, TO; Jegede, T; Adeniran, AF; Omobepade, BP (2017). Toxicity of Cassava Effluents to Catfish, *Clarias gariepinus*, and the Effect on Some Target Organs. *Annals of Aqua. & Res*, 4(2), 1034.

Bozorg-Haddad, O; Delpasand, M; Loáiciga, HA (2021). Water quality, hygiene, and health. *In* Bozorg-Haddad, O. (ed), Economical, Political, and Social Issues in Water Resources.pp. 217-257. Elsevier.

Dahunsi, SO; Oranusi, US (2013). Haematological response of *Clarias gariepinus* to rubber processing effluent. *Ann. Rev. & Res. in Bio*, 3(4), 624-635.

Enujiugha, VN; Nwanna, LC (2004). Aquatic oil pollution impact indicators. *J. Appl. Sci. Environ. Manage.* 8 (2), 71-75.

Finney, DJ (1982). Probit analysis. Cambridge University Press, Cambridge, 318pp.

Ibiam, UA; Obasi, D; Orji, O; Aja, P; Chukwu, C; Obasi, J (2015). GC-MS Analysis, Acute Toxicity and Oxidative Stress Potentials (Effects) of *Albizia chevalieri* Extract on Juvenile African catfish (*Clarias gariepinus*). *Middle-East J. of Sci. Res.* 23 (2): 192-199.

Isaac, LJ; Abah, G; Akpan, B; Ekaette, IU (2013). Haematological properties of different breeds and sexes of rabbits. *Proceeding of the 18th Annual Conference of Nigerian Society of Animal Science,* 24-27.

Matouke, MM; Obadiah, AA (2015). Haematological and histological evaluation of African catfish *Clarias gariepinus. Res. in Agric, Livestock and Fisheries,* 2(3), 475-482.

Mustapha, A. (2019). Importance Of pH Control In Aquaculture. https://www.researchgate.net/publication/340870601

Ogunwusi, AA (2014). Wood waste generation in the forest industry in Nigeria and prospects for its industrial utilization. *Civil and Environ. Res.* 6(9), 62-69.

Okey, IB; Ayotunde, EO; Patrick, BU (2021). Behavioural Responses and Mortality of Clarias gariepinus Juveniles Exposed to Acute Concentrations of Paraquat. *Sumerianz J. Agric. and Vet*. 49-54

Organisation for Economic Cooperation and Development (OECD), (1992). Guidelines for the testing of chemicals: Fish acute toxicity test, Document 2003. 10: 578-519.

Saalidong, BM; Aram, SA; Out, S; Lartey, PO (2022). Examining the dynamics of the relationship between water pH and other water quality parameters in ground and surface water systems. *PLoS One*, 17(1):e0262117.

Sabra, FS; Mehana, ESED (2015). Pesticides toxicity in fish with particular reference to insecticides. *Asian J. of Agric. and Food Sci.*, *3*(1).

Saidu, Y; Lawal, M; Isezuo, SA; Shehu, RA; Sahabi, DA; Bilbies, LS (2007). Partial purification and elucidation of the mechanism of the hypoglycaemic agent of aqueous. *J. of Pharma. and Toxico.*, 2, 513-523.

SPSS. IBM SPSSsoftware for Windows version 20.0, SPSS Inc., Chicago, IL;2011

Svobodova, ZD; Pravda; Palackova, J (1991). Unified methods of haematological examinations of fish. Research Institute of Fish Culture and Hydrobiology, Vodany, (Czechoslovakia) 49Pp.

Yusuf, S; Sanyinna, YM; Audu, BS; Wakawa, AI; Hassan, BA (2022). Comparative acute toxicity of aqueous extracts of *Tephrosia vogelii* and *Albizia gummifera* on *Clarias gariepinus* (African catfish) fingerlings. *Int. J. Sci and Techno Res. Arch.* 2, 37-46.