Growth response, hematological indices and carcass constituent element of *Clarias gariepinus* fed with natural decoction of *Parkia biglobosa* leaves

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Abstract

This study was carried out to evaluate the growth performance. Haematological indices and carcass analysis of *Clarias garipinus* fed diets containing varying concentration of crude extract of *Parkia biglobosa*. The experiment was conducted at the fisheries and Hydrobiology Research Unit of Department of Animal and Environmental Biology of Kebbi State University of Science and Technology, Aliero. All analysis was carried out according to standard method. One hundred and forty (140) fingerlings were distributed in to four rectangular concrete tanks with 35 fingerlings in each tank. A basal diet of 40% crude protein was prepared 1kg of basal diet was mixed with 0.0, 0.5, 1.0 and 1.5g/kg crude extract of *Parkia biglobosa* respectively. Diets representing D_1, D_2, D_3 and D_4 group. The phytochemical analysis carried out on *Parkia biglobosa* shows the presence of all phytochemicals tested which are alkaloids, steroid saponins, tannins, glycoside and flavonoids. Growth parameters of *Clarias garipinus* fed with crude extract of *Parkia biglobosa* show that the highest final weight (141.16±8.66g). Highest means weight gain (124.51±1.87g). And highest specific growth rates (3.14±0.05) were obtained in male fed with 0,5g/kg of crude extract *Parkia biglobosa*. While list final weight (78.12±19.05). Mean weight gain (55.66±19.03). And list specific growth rates (2.04±0.44) were obtained in fed with 0.0g/kg concentration which is the control. The white blood cells, red blood cells, Haematologobin content and packed cell volume were significantly high ($10.28±1.100×10^9$/L, $1.30±0.100×10^9$/L, 5.18±0.200G/dl and 16.700±1.100% respectively) in the fed with 0.5g/kg concentration of the extract. The result of proximate composition shows that fed with 0.5g/kg concentration of crude extract of *Parkia biglobosa* had the highest crude protein (42.31±0.02%) and lipid (3.81±0.02%). While fed with the control diet (0g/kg) had the least crude protein (38.42±0.25%) and lipid (0.70±0.02%). There were significant differences across the growth parameters, haematological indices, and proximate composition. The water parameters were within the acceptable rage for culture. This study revealed that crude extract of *Parkia biglobosa* can be used to enhance the growth of *Clarias garipinus*, with little or no adverse effects on haematological indices and proximate composition.

Keywords: growth response, nutrient utilization, *Clarias gariepinus*, *Parkia biglobosa*, protein

Introduction

Fish is one of the superlatives of good and frugal sources of plummet of lean meat and more than moiety of the population on earth depends on fish for dietary protein and amino acid composition that is higher in cysteine than most other animal protein. From the past period heavy importance has been given to fish making and their nutrition ability of cultured fish to exhibit its genetic potential for growth and reproduction. Live food is the best to feed fish as it is naturally healthy (Oramary *et al*. 2006).

The demand for fish is increasing throughout the world due to the recognition of its nutritional value (Saliu, 2008) [29]. In Nigeria, the hope of the fishery industry development is in aquaculture due to the over exploitation of the capture fisheries (Oguniyi, 2007) [26].

In aquaculture, nutriment is unstable because fish feed transitive of about 40-50% amount of production costs. Fish nutriment has risen up dramatically in recent years with the change of spanking new balanced designating diets which promote the best fish growth and overall level of function. The growth of new species-explicit diet formulations supports the aquaculture i.e. fish farming diligence as it increase to satisfy steadily increasing demand for inexpensive, free from risk and greater quality fish and a large body of salt water food products. Aquaculture is the capable raising of fish and other aquatic organisms in artificial ponds. At an earlier time reported by Miles and Chapman (2006) [15] one of the areas which the fisheries potential of Nigeria could be exploited is through aquaculture, the development and expansion of which would however depend mainly on many factors. These include the availability of good quality and relatively inexpensive feed ingredients for the formulation of compounded food since supplement feed brings greater yields in ponds than if the fish

were left to depend on natural (aquatic) food. Various feeds are used in culturing fishes to enhance adequate fish growth, reproduction and survival (Miles & Chapman, 2006) [15]. Fishmeal which serves as the main protein source for fish feed because of its high-quality protein content, is not only expensive but also usually unavailable (Tacon & Barg, 1998) [18] particularly in developing countries. Fagbenro and Davies (2003) [7] and Ogunji *et al*. (2003) [17] reported the efforts to replace fishmeal with vegetable protein from more sustainable sources by many workers. Plants proteins have been extensively studied for use in fish feed formulations for aquaculture (Gatlin *et al*., 2007) [8]; these include various pulses and lupins in carnivorous fishes such as rainbow trout Oncorhynchus mykiss (Glencross *et al*., 2004, 2007) [10, 9]. Ordinarily, plants provide nearly two thirds of the world supply of food protein for human and animal in which 10-15% come from legumes. Among the leguminous plants used by man is the tree of (*Parkia biglobosa*). Earlier reports of Cook *et al*. (2000) [5] and Lockeett *et al*. (2000) [13] showed that *P. biglobosa* is a plant legume with an outstanding protein quality and its protein and amino acid composition has been reported.

World Health Organization encourages the use of medicinal herbs and plants to substitute or minimize the use of chemical agents (Kabaherda *et al*., 2009) [24]. Much of this interest arises from increased public awareness and banned of the use of antibiotics as growth promoters in aquaculture diets. In the last decade, some studies show the positive effects of dietary medicinal plants and feed additives on growth and feed utilization in fish (Abdullahi *et al*., 2001) [22].

Plants parts have been shown to cause death of fish and changes in biochemical response of *Channa punctatus* (Tiwari and Singh, 2004) [28], haematological and histopathological effects on *Clarias gariepinus* (Omoniyi *et al*., 2002). Ubaha *et al*. (2012) reported decreased haemoglobin, haematocrit and erythrocytes when they studied the effect of *Hypoestes forskalei* leaf extract on the behavior of *C. gariepinus*. Ojutiku *et al*. (2013) [27] studied the effect of acute concentration of cypermethrin on juveniles of *C. gariepinus* and reported that white blood cells (WBC), MCV, MCH, PCV and neutrophil levels increased, while RBC and lymphocytes reduced. Although anaesthetia of fish have positive effects on the fish during transportation and handling, some an aesthesias can course dangerous problems to the fish organs and the blood parameters (Nicula *et al*., 2010) [25]. The most conventional protein sources used in fish feed such as soya bean, cotton seed, fish meal etc, and are becoming expensive especially to small scale fish farmers in Nigeria. Also, the competing demand for fish feed stuff such as corn, soya bean and groundnut cake has made feed production expensive.

Clarias gariepinus belongs to the family *Clariidae* they are indigenous fishes of Nigeria. The biology and distribution of *C. gariepinus* have been described in various texts such as in Abolagba and Melle, (2008) [21]; Adebayo-Tayo *et al*. (2008) [23] they reported that *Clarias gariepinus* has long body with dorsally-flattened head and body- plate. It has a large terminal mouth and four pairs of barbells, the nostrils are far apart, the anterior one being tubular and posterior one equipped with long tentacles. The authors further reported that, the dorsal and the anal fins are without spines and are very long, reaching almost to the caudal fin, which is a single rounded lobe. The air bladder is bi-lobed. The fish possess numerous small teeth which are arranged in band on the jaw and also on the roof of the mouth, and these bands of teeth is the most reliable means of differentiating the species (Al-jufaili and Opara, 2006).

C. gariepinus has long and thin gill rakers on the first brachial, and about 30.8% of standard length (Kumolu-Johnson and Ndimele, 2011). Distance between extreme of dorsal fin and origin of caudal fin is small (Olokor *et al*., 2011).

This high demand for this feed stuff by man and consequently the high price has made other means such as "*P. biglobosa*" inevitable. Since the primary objective of fish nutrition work is geared towards reducing protein cost in fish feed, it is of interest to investigate and utilize the suitable abundant conventional and non-conventional feed resources available in Nigeria for feed formulation. This work is therefore intended to evaluate effects of locust beans in the feed of *Clarias gariepinus* as a protein source.

Materials and methods

The experiment was conducted at the Fisheries and Hydrobiology Research Unit of Department of Animal and Environmental Biology of Kebbi State University of Science and Technology, Aliero. Aliero is located in Sudan savannah vegetation zone of Nigeria. It is on latitude $12^{0}18`26``$N and longitude 4^{O} 29' 40". The study area is characterized by a long dry season which started from October to May; with cool dry air during the harmattan; (November-February) and hot dry air during March-May. Rainy season started in June and ends in September. Annual rainfall in the area ranged from 500 to 724mm (Tournas *et al*., 2001). The mean relative humidity ranges between 14.9% and 40% during March and June respectively. Ambient temperature can reach up to 41^{o}C during April and May and may fall below 20^{o}C during December and January (Tournas *et al*., 2001).

Acquisition, identification and processing of *Parkia biglobosa* leaves

Parkia biglobosa leaves were obtained by hand picking using clean sharp knife within the campus of Kebbi State University of Science and Technology, leaves were washed thoroughly with distilled water, dried to remove moisture, ground to powdered form using pestle and mortar and sieved.

Phytochemical screening

The qualitative phytochemical analysis of plant extract was carried out according to Standard methods of Association of Analytical Chemist (AOAC, 2000), as follows:

Test for alkaloids

The sample was acidified with acetic acid and a drop of Mayer's reagent was added. A white precipitate indicates the presence of alkaloid.

Test for Flavonoids

On addition of conncentration. HCl acid in ethanol extract of the sample, a red colour appeared which indicates the presence of flavonoids.

Test for glycoside

The extract was filtered and sugar was removed by fermentation with baker's yeast. The acid was removed by precipitation with $Ba(OH)_2$. The remaining extract contained the glycosides. The hydrolysis of the solution was done with concentration of Sulfuric acid and after the hydrolysis the pressence of sugar was determine with the help of Fehhling's solution.

Test for steroids

The extract was mixed with 3ml of Chloroform and 2 ml conc. Of Sulfuric acid were poured from the side of the test tube and the colour of the ring at the junction of two layers was noted. A red colour showed the presence of steroids.

Test for tannins

Extract was added in 1% ferric chloride and the colour was observed. Presens bluish black colour which disappear on addition of dilute H_2SO_4; giving a yellow brown precipitate showed the presence of tannins.

Test for saponins

Extracts was diluted with water to 20ml and was shaken in a graduated cylinder for 15min.Formation of 1cm layer of foam indicates the presence of saponins.

Isolation of crude saponins

Saponins contents of the crude extract of leaves were isolated according to the method of Bennett and Klich (2003). 200ml of 20% ethanol was added to 20grams of *Parkia biglobosa* leaves powder sample in a 250 ml conical flask. The mixture was heated over a hot plate at 55ºC for 4 hours with continuous stirring. The residue of the mixture was re-extracted with another 100 ml of 20% aqueous ethanol after filtration and heated for 4 hours at55ºC with constant stirring. The combined extract was evaporated to 40 ml over water bath at 90ºC. 20 ml of diethyl ether was added to the concentration of 250 ml separator funnel and vigorously agitated from which the ether layer was discarded and the aqueous layer was recovered. 60 ml of n-butanol was added and extracted twice with10 ml of 5% sodium chloride. The remaining solution after discarding the sodium chloride layer was heated in a water bath for 30 minutes, and the solution was transferred into a crucible then dried in an oven to a constant weight.

Acquisition of feed ingredients

Feed ingredient used in formulating the diet include maize and groundnut cake, were sourced for locally in the Aliero metropolis. Fish meal, (Danish), lysine, methionine blood meal, bone meal, vitamin premix was purchased from Agro-tech Sokoto State.

Preparation of experimental diet

A basal diet of 40% crude protein (pear squire method) was prepared using the above ingredient. *Parkia biglobosa* saponin extract at 0 g/kg (Diet 1), 0.5g/kg (Diet 2), 1.0g/kg (Diet 3), and 1.5g/kg (Diet 4) were added. The appropriate quantities of ingredients in each diet were weighed and mixed thoroughly using electric feed mixer (Kenwood). Each diet was further mixed with warm water. The mixed dough was subjected to palliating using an Electric feed pelletized with 2mm diameter diet. The palliated feeds were sundried and stored until the commencement of the feeding trial.

Acquisition of the experimental fish

A total of 140 *C. gariepinus* fingerlings of approximately equal body weight were purchased from a private hatchery in Aliero Local Government area. The fingerlings were transported to the Fisheries and Hydrobiology Research Unit of Animal and Environmental Biology Department, Kebbi State University of Science and Technology, Aliero. The fishes were acclimatized for one week, during which they were fed with the control diet (40% crude protein).

Experimental design

Two hundred and forty (140) fingerlings were distributed into 12 rectangular concrete tanks of four different groups *Parkia biglobosa* saponin concentrations in triplicate (i.e 20 fingerlings in each tank). The four experimental diets were randomly allocated to the experimental tanks, in a completely randomized design (CRD) with three replicates per treatment. The water for the experiment was sourced from a borehole.

Experimental fish management

Experimental fish in each concrete tank were fed at 5% body weight for 12 weeks of the feeding trial period. The daily ration was split into two and fed twice daily at 9:00am, and 5:00pm. The ration was adjusted weekly based on the new weight gain in each concrete pond. The tanks were cleaned, and left feeds together with faucal residues were siphoned out before feeding. Water level were maintained in concrete tank, weekly water in the tanks were drained and replaced.

Growth parameters

The body weight was recorded on weekly basis by weighing all the fingerlings in each experimental unit on a field weighing balance.

Weight gain

Mean weight gain (g) = Final mean weight – Initial mean weight (g)

Percentage weight gain

$$PWG = \frac{\text{Final weight – initial mean weight X 100}}{\text{Initial body weight}}$$

Specific Growth Rate (SGR)

$$SGR = \frac{\ln(W2) - \ln(W1) X\ 100}{T}$$

(Kabaherda *et al.*, 2009)

Where,
log = Natural logarithm
W_2-W_1 = Final and Initial weight of fish (g) and
T = Period in days

Feed Conversion Ratio (FCR)

$$FCR = \frac{\text{Feed fed (g)}}{\text{Weight gain (g)}}$$

Fish Survival Rate

$$SR = \frac{\text{initial number of fish stocked - mortality}\ X\ 100}{\text{Initial number of fish}}$$

Haematological analysis

At the end of the experiment, samples of fish from all the experiments were subjected to haematological analysis to determine the effect of the test ingredients on the fish blood.

Blood sample collection

One point five milliliters (1.5ml) of blood were collected by direct cardiac puncture as described by Adebayo-Tayo *et al.* (2008) [23]. The cardiac was punctured and wiped with dry tissue paper to avoid contamination with mucus before puncture. The needle was inserted at right angle to the vertebral column of the fish. The blood was taken under gentle aspiration until about 3ml had been obtained. The needle was gently withdrawn and the blood transferred into EDTA containers and complete haematology was done using modified hyme's dilution fluid.

Analysis

The collected blood was introduced into Neubauer Counting Chamber (Neubauer bright line Marienfield, Germany with 0.100mm, 0.0025mm^2 specifications and model No. 273165) and then full blood count was conducted.

Carcass analysis of fish

Experimental Fish were cleaned, eviscerated and gutted. The fish were oven dried at 60^{o}C for 24 hours then transferred into desiccators and cooled for 30 minutes. Dried fillet was ground to 0.3 mm size using blender and the powder was stored in desiccators for further proximate composition analysis. The analysis was done as described by Association of Analytical Chemist (AOAC, 2000), as follows:

Determination of moisture content

A glass petri-dish was accurately weighed, after which an approximately. 5g of the samples were placed in weighed crucibles maintained at 80^{0}C in an oven until constant weights were obtained. The samples were transferred into desiccators to cool to ambient temperature and reweighed. The difference in weights indicates the dry matter and was calculated as follows. The moisture content was calculated in percentage as follows:

$$\% \text{ moisture} = \frac{W1 - W2}{W1} \text{ x } 100$$

Where; W1 = Wet sample, W2 = Dry sample

Determination of lipids content

Cold method of extraction was used to determine fats and oil in the samples, 10g of samples of accurately weighed into round bottom flasks then 50ml of n-hexane was added to the sample and covered for 24 hours for proper extraction of oil after which clean and dried empty beakers were weighed and weights noted. The samples were decanted into the beakers and was heated to dryness and transferred in a desiccator to cool and weighed and new weights taken. Percentage fats were calculated thus:

$$\% \text{ fat or oil} = \frac{W1 - W2}{\text{Weight of sample used}} \text{ x } 100$$

Determination of ash content

One gram of sample was accurately weighed in a platinum crucible and recorded as w_1, this was transferred to muffle furnace at the temperature of 550^{o}C for 8 hours until a white ash was obtained. The platinum crucible was removed and place in a dedicator to cool and weighed, the value was recorded as W_2. Percentage ash content was calculated as:

$$\% \text{ ash} = \frac{W1 - W2}{\text{Weight of sample used}} \text{ x } 100$$

Crude fiber determination

Ten gram of samples was digested in 200ml of 1.25% H_2SO_4, the mixture was boiled for 30min, filtered and washed with hot water to reduce the acidity, this was tested with pH paper, and the residue was again digested in 200ml of 1.25% NaOH. The mixture was heated for 30min. filtered and washed with hot water and dried in an oven, this was transferred to a platinum crucible and weighed (W_1) then heated in a furnace of 550^{o}C to a and weighed again (W_2). Percentage crude fibre was calculated as:

$$\% \text{ Crude fibre} = \frac{W1 - W2}{\text{Weight of sample used}} \text{ x } 100$$

Protein determination

The protein nitrogen in 2.5g of dried samples was converted to ammonium sulphate by digestion with concentrated H_2SO_4 and in the presence of Cu_2SO_4 and Na_2SO_4. This was heated and the ammonia involve was steam distilled in 4% boric acid solution, the nitrogen from ammonia were deduced from the titration of the trapped ammonia with 0.1 NH_2SO_4 with methyl red indicator until a pink colouration was observed indicating

the end point of titration. Protein was calculated by multiplying the deduced value of nitrogen by a protein constant 6.25.

Water quality analysis

Temperature, pH, Dissolved oxygen and Total Dissolved Solid were monitored throughout the course of the experiment. Temperature was measured with mercury in glass thermometer; Hydrogen ion concentration was monitored with pH meter. Dissolved oxygen and Total Dissolved Solid were also monitored using DO and TDS meter. The parameters were determined weekly as described by Obaroh and Nzeh (2013).

Statistical analysis

Data obtained on growth, haematological parameters, proximate composition and water parameters were subjected to One-way Analysis of Variance (ANOVA). The Statistical difference between the means were considered at P<0.05. The analysis was carried out using SPSS version 20.0 All data were presented in mean ± SD.

Results

Photochemical analysis *Parkia biglobosa* leaves

The Phytochemical analysis carried out on *Parkia biglobosa* leaves extract show the presence of all phytochemicals tested (alkaloids, flavonoids, Saponins, Glycoside, steroids and tannins) (Table 1). The results of this study show that saponins were highly present; phenol and Glycoside were moderately present, while tannins, glycoside and flavonoids were slightly present in *Parkia biglobosa* leaves aqueous extract.

Table 1: Qualitative phytochemical analysis of *Parkia biglobosa* leaves extract

Phytoconstituents	Screening test
Alkaloids	+
Flavanoid	+
Phenols	++
Steroids	+
Saponins	+++
Tannins	-
Terpenoil	-
Glycoside	++

Key: +++ = Highly present; ++ = Moderate present; + = slightly present

Growth parameters of *Clarias garipinus* fed with *Parkia biglobosa* saponin decoction

Table 2 shows the growth parameters of *Clarias garipinus* fed with *Parkia biglobosa* saponin leaf extract. The highest final weight (141.16±8.66g), highest Mean weight gain (124.51±8.84g), highest % mean weight gain (546.56±43.46%) and highest specific growth rate (3.14±0.05) were obtained in (Group B) fed with 0.5g/kg concentration of *Parkia biglobosa* saponin leaf, while the highest feed conversion ratio (2.30±0.019) was obtained in the group fed with control diet. On the other hand, the least growth parameters were obtained in (Group A) fed with 0.0g/kg concentration which is the control. The result shows significant difference at P< 0.05 when the control group was compared with other groups.

Table 2: Growth parameters of *Clarias gariepinus* fed crude extract of *Parkia biglobosa*

	A (0.0g/kg = Control)	B (0.5g/kg)	C (1.0g/kg)	D (1.5g/kg)
IW (g)	24.46 ± 0.22^{a}	24.49 ± 0.37^{a}	24.60 ± 0.41^{b}	24.66 ± 0.28^{c}
FW (g)	74.12 ± 19.05^{a}	146.05 ± 5.92^{d}	103.25 ± 1.51^{b}	141.16 ± 8.66^{d}
MWG (g)	54.56 ± 19.03^{a}	123.56 ± 5.62^{d}	87.64 ± 1.91^{b}	124.51 ± 8.84^{d}
PMWG (%)	$2\ 87.77\pm84.45^{a}$	573.76 ± 18.96^{e}	380.08 ± 15.33^{b}	546.56 ± 43.46^{d}
SGR (g)	2.08 ± 0.44^{a}	3.14 ± 0.05^{d}	2.71 ± 0.05^{b}	3.11 ± 0.12^{d}
FCR	2.70 ± 0.34^{b}	2.15 ± 0.01^{a}	2.30 ± 0.019^{c}	2.24 ± 0.03^{a}

n = 3, Values are expressed as Mean ± Standard deviation, Groups with similar superscript along the raw shows significant difference at P< 0.05. Key: IW = Initial Weight, FW = Final Weight, MWG= Mean Weight Gained, PMWG= Percentage Mean Weight Gained, SGR= Specific Growth Rate, FCR = Food Conversion Ratio.

Haematological Indices of *Clarias garipinus* fed with *Parkia biglobosa* saponin extract

Mean values for haematological indices of *C. gariepinus* fed with *Parkia biglobosa* Saponin leaf extract are presented in Table 3 Result showed significant difference (P<0.05) for all the parameters measured, when compared to the control. There was increased in values of some haematological parameters *C. gariepinus* fed with varying concentrations of *Parkia biglobosa* Saponin leaf. The white blood cells, red blood cells, Haemoglobin content and packed cell volume were significantly high ($10.28\pm1.100x10^{9}$/L, $1.30\pm0.100x10^{9}$/L, 5.18±0.200g/dl and 16.70±1.100% respectively) in the group fed with 0.5g/kg concentration of the extract. While the lowest values of white blood cells, red blood cells and packed cell volume were ($3.10 \pm 0.10x10^{9}$/L, $0.738 \pm 0.52x10^{9}$/L, and 1.90 ± 0.100% respectively) were obtained in (Group A and B) fed with 0.0g/kg 0.5g concentration. The least haemoglobin content was obtained in (Group A) fed with 0.0g/kg concentration which is also the control group. The result shows significant difference on haematological indices at P< 0.05 when the control group was compared with other groups.

Table 3: Haematological indices of *Clarias gareipinus* fed crude extract of *Parkia biglobosa* saponin

	A (0.0g/kg)	B (0.5g/kg)	C (1.0g/kg)	D (1.5g/kg)
WBC ($x10^9$/L)	9.20 ±1.100^d	3.10 ± 0.100^b	10.22 ± 1.10^e	4.16± 0.200^c
RBC ($x10^9$/L)	1.30± 0.100^c	0.38 ± 0.572^a	1.10 ± 0.200^b	0.87 ± 0.100^a
Hb (g/dL)	1.40 ± 0.100^a	2.30 ± 0.10	4.22 ± 1.100^b	5.18 ± 0.200^c
PCV (%)	1.90 ± 0.100^a	9.80 ± 1.100^b	14.15 ± 0.200^c	16.70 ± 1.100^d

n = 3. Values are expressed as Mean ± Standard deviation. Groups with similar superscript along the raw shows significant difference at P< 0.05. Key: WBC =White Blood Cells, RBC = Red Blood Cells, Hb = Haemoglobin, PCV =Packed Cell Volume

Proximate composition of *Clarias garipinus* Fed with *Parkia biglobosa* saponin decoction

The results of proximate composition of *Clarias garipinus* fed with *Parkia biglobosa* saponin extract are shown in Table 4. The results shows that (Group B) fed with 0.5g/kg concentration of *Parkia biglobosa* saponin extract had the highest crude protein (42.01±0.02%), Lipid (3.81±0.02%), Fibre (4.15±0.01%) and Dry matter (92.70±0.35%), while (Group A) fed with the control diet (0g/kg) had the least crude protein (38.42±0.25%), Lipid (0.70±0.02%), Fibre (2.12±0.06%) and Dry matter (7.18±0.05%). The results show significant difference among the varying concentrations of *Clarias garipinus* fed with *Parkia biglobosa* Saponin extract.

Table 4: Proximate Composition of *Clarias garipinus* fed crude decoction of *Parkia biglobosa*

	A (0.0g/kg= Control)	B (0.5g/kg)	C (1.0g/kg)	D (1.5g/kg)
C.P (%)	38.42±0.25^b	40.09±0.25^b	42.31±0.02^d	40.11±0.15^c
Lipid (%)	0.70±0.02^a	1.90±0.01^b	3.81±0.02^c	3.77±0.02^c
Fibre (%)	2.12±0.06^a	2.40±0.14^b	4.15±0.01^d	4.10±0.04^d
Drymatter (%)	71.18±0.05^a	90.05±0.10^b	92.70±0.35^d	91.20±0.61^c

n = 3, Values are expressed as Mean ± Standard deviation, Groups with similar superscript along the raw shows significant difference at P< 0.05

Physicochemical parameters of water used for culture

The result on temperature and TDS shows that there are significant differences between the control and other treatment groups. While the result of pH and DO show no significant Differences among the groups (Table 5). Result of temperature in this study ranged of 30.67±0.65to 30.82±0.13^{0}C. The pH treatment ponds ranged from 7.01±0.03 to 7.03±0.45, while Total dissolved solid (TDS) of all treatment ponds ranged between 192.89±0.61to 204.89±1.05ppm. The dissolved oxygen (DO) in all treatment ponds ranged from 3.45±0.23 to 3.57s±0.15mg/l.

Table 5: Physicochemical parameters of pond water used for culture

Treatment/Parameters	Temperature (^{0}C)	pH	TDS (pp/m)	DO (mg/l)
D1 (control)	30.67±0.65^b	7.03±0.45^a	194.03±8.71^a	3.52±0.56^a
D2 (0.1g/l)	30.70±0.54^a	7.01±0.03^a	201.55±1.62^b	3.45±0.23^a
D3 (0.15g/l)	30.82±0.13^a	7.02±0.02^a	204.37±1.05^c	3.57±0.15^a
D4 (0.2g/l)	30.75±0.54^a	7.01±0.34^a	192.89±0.61^a	3.49±0.02^a

n = 3. Values are expressed as Mean ± Standard deviation, Groups with similar superscript along the column shows significant difference at P< 0.05. Key: TDS= Total dissolved solid; DO= Dissolve Oxygen

Discussion

The result onphytochemical analysis revealed that *Parkia biglobosa* leaf extract contains alkaloids, flavonoids, Glycoside, steroids, tannins and Saponins. These phytochemical components of the Parkia leaves extract have been established. In previous studies the presence of tannins, saponins, alkaloids, carbohydrates, phenols, flavonoids, anthraquinones, cardiac glycosides, sterols and resins were reported (De and Ifeoma, 2002; Natarajan *et al*., 2003; Biswas *et al*., 2002, El-Mahmood *et al*., 2010).

This study shows increase in growth rate in the group of fish fed with *Parkia biglobosa* extract. This result is in line with the report of Ochang *et al*. (2015) who reported that the growth of fish increased as *M. oleifera* leaf extract increased in the diets. Also increase in growth was also reported when *Moringa oliefera*leaf extract was fed to *Clarias gariepinus* (Obaroh *et al*., 2018). Furthermore, this study is in accordance with Obaroh *et al*. (2014) who reported that *Azadirachta indica* saponin could be used to enhance the growth rate of Nile tilapia with a considerable increase in growth at a minimal concentration of the crude extract.

The higher growth rate of fish observed in fish fed with crude extract could be attributed to the presence of saponin in *Moringa oleifera* leaf as reported by Johston *et al*., (1982) who reported that saponin increased the permeability of intestinal mucosal cells in vitro study, which enhance the absorption of digested food materials in the intestine. Saponin-rich plant extract (*Yucca schidigera*) have been found to improve growth, feed efficiency and heath in ruminant animal (Madar and Brumm, 1987). Moreover, Francis *et al*. (2001), also reported

that Quillaja saponin could be used to enhance growth, reduced metabolic rate and suppress reproduction in tilapia.

The heamological result in this study is in agrees with the results of Talpur (2013) who reported significant change in the count of the large haemological parameters, lymphocytes, heterophils and monocytes among the experimental groups when *C. gariepinus* wastreated with neem leaf extract.

The variation in hematological parameters with variation in the concentration of the plant extract is similar to the study of Omoniyi *et al* (2002) on effect of varying concentrations of tobacco (*Nicotiana tobaccum*) leaf dust extract on haematological changes in *Clarias gariepinus*, who observed variation in the heamatological parameters of *C. gariepinus* exposed to tobacco leaf extracts. Gabriel *et al.* (2007) recorded significant changes in the WBC of *C. gariepinus* exposed to cassava leaf extract. Similar changes were also reported by Svoboda *et al*. (2001) who reported decreased in RBC, WBC value and hemoglobin content in *C. gariepinus* after exposure to mango leaf extract. This pattern of response may be attributed to heterolysis which results in haemodilution, a means of diluting haemoconcentration of these extracts, this reduces the effect of the toxicant in the fish system (Smith *et al.*, 1999). Besides, it may result from either an increase in the rate of haemoglobin destruction or decrease in its productivity or synthesis (Reddy and Bashamo, 2009). Prolong reduction also leads to blood dyscresis and degeneration of the erythrocyte (Buckley *et al.*, 2006). There are significant differences in percentage moisture, Ash, fibre, protein, Carbohydrate and lipid content of *Clarias garipinus* fed with *Moringa oleifera* saponin extract. The higher crude protein content of the *Clarias garipinus* observed in this study is higher than the value recorded by Oduro *et al*. (2008), and Odetola *et al*. (2012).

Conclusion

The study revealed that *Parkia biglobosa extract* contains alkaloids, flavonoids, Glycoside, steroids, tannins and Saponins. It also shows that *Parkia biglobosa* saponin decoction can be used to enhance the growth of *Clarias garipinus.* The present study further revealed that crude extract of *Parkia biglobosa* saponin increases most of the haemological indices and some proximate component especially, the lipid and crude protein. Thus the use of *Parkia biglobosa* could be of benefit in the culture of *Calarias garipinus.*

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