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SURVIVAL RATE AND ORGANO-SOMATIC INDEX OF AFRICAN CATFISH (*Clarias gariepinus)* FINGERLINGS FED DIFFERENT GRADED LEVELS OF GIANT MILKWEED (*Calotropis procera*) LEAVES

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ABSTRACT

The study investigated the effect of giant milkweed (*C. procera)* on the survival and health status of *Clarias gariepinus* fingerlings. Six experimental diets were formulated. The control diet was prepared with no *C. procera* supplementation while the other diets were supplemented with *Calotropis procera* containing 0.5%, 1.0%, 1.5%, 2.0% and Oxytetracycline (30 mg/kg) as a positive control. *Clarias gariepinus* fingerlings (5.20±0.0g) were replicated twice with 20 fish per replicate and were fed twice daily for eight (8) weeks at 3% body weight. The survival rate, condition factor and organo –somatic indices were measured. Phytochemical screening of *C. procera* leaves was determined using a standard method. Data were analyzed using descriptive statistics and ANOVA at P = 0.05. The survival rate was higher in all the dietary groups (90.00% - 95.00%) and there was no significant difference (P> 0.05) among the dietary groups. The result of the organo-somatic index shows that there was a general increase in the value obtained in the liver and intestine. There were significant difference (P < 0.05) among the dietary groups except for kidney which shows no significant difference (P> 0.05). Phytochemical screening revealed the presence of flavonoids, tannins, glycosides, saponins, protein and amino, phenol, triterpenes and steroids. This study shows that *C. procera* can be used as a dietary ingredient in fish and the inclusion level of 0.5% is therefore recommended for optimum productivity in fish farming.

Keywords: *Clarias gariepinus, Calotropis procera*, Oxytetracycline, Survival, Phytochemical screening

INTRODUCTION

Catfish constitute a unique and large group of commercially important freshwater fish that is widely distributed throughout the world. *Clarias gariepinus* is one of the most important cultured fish species in African waters and other Asian countries and represents one of the most widely produced food fish in the world (Fasakin *et al*., 2003). *Clarias gariepinus* is characterized by the ability to grow on a wide range of artificial and natural foods, attainment of large size within a short time, high yield potentials and hardness, tolerance to low dissolved oxygen, ability to withstand stress, disease and ability to spawn easily. Nutrition is a major factor that determines the physiological well being of an animal. The use of natural feed additives is becoming more important for fish feeding rather than chemical feed additives due to the cumulative effects of the chemical components on animal and human health (Bello *et al*., 2014).

However, research and studies into cheaper alternative sources for the development of least-cost feed for a small enterprise fish farmer is an utmost priority in developing countries. *Calotropis procera* belong to the family of Apocynaceae and subfamily of Asclepiadaceae (Aliyu, 2006). It is commonly known as the apple of Sodom, and giant milkweed. Medicinal uses of *Calotropis procera* are manifold and are rather similar to those of *Calotropis gigantea* (L.). The leaves are used to treat insomnia, dysentery, colds, whooping cough, oedema, intestinal worms, psychosis and absence of menstruation and as a cardiotonic, to treat high blood pressure and palpitations (Basu, 2020). The *C. procera* leaves have hitherto not been well studied in aquaculture. Hence, the present study on *C. procera* leaves was investigated to determine the dietary effect of *C. procera* leaves on the survival rate and organo-somatic index of *Clarias gariepinus* fingerlings.

METHODS AND MATERIALS

Collection of plant materials and identification

The fresh leaves of *C. procera* were collected from Ilesa, Osun State. *Calotropis procera* leaves were washed with sterile clean water and air-dried for 3-4 weeks under the shed and blend into powder form. This powder was stored in nylon and kept at room temperature until required. The plant was identified at the Department of Biological Sciences (Botany Programme), Olusegun Agagu University of Science and Technology, Okitipupa.

Determination of Phytochemical Screening

Phytochemical constituents such as saponins, phenols¸ tannins, flavonoids, glucosinolates, triterpenes and steroids, proteins and amino acids were done as described by Olusola *et al*., (2017)

Collection and acclimatization of experimental fish

Two hundred and forty (240) healthy and active fingerlings of *Clarias gariepinus* with mean weight of 5.02±0.0g were obtained from Lokoabata Farm, Okitipupa. The fish were acclimated for one week in outdoor holding tanks at the Fisheries and Aquaculture Technology Laboratory, Olusegun Agagu University of Science and Technology, Okitipupa. During the period the fish were fed with commercial diets (blue crown 0.02mm) of 40% crude protein twice daily at 3% body weight.

Preparation of experimental diet

The ground leaves of *C. procera* at different inclusion levels 0%, 0.5%, 1.0%, 1.5%, 2.0% were mixed with feed ingredients such as fish meal, soybean, groundnut cake, yellow maize, millets, vitamin premix, vegetable oil and starch that was obtained from feed mill at Odogbolu, Ogun State to formulate 40% crude protein diet, 12% ash, 8% crude fibre, 9% ether extract, 6% moisture, and 25% nitrogen-free extract. *Calotropis procera* was added in Treatment 2-5 as feed additives in the study as a partial replacement for vitamin-mineral premix and Oxytetracycline (30 mg/kg) added to Treatment 6 as positive control and control (without *C. procera*) which is negative control. Each diet mixture treated separately was extruded through a 2 mm mincer pelleting machine to form a noodle-like strand which was mechanically broken into suitable size for the *Clarias gariepinus* fingerlings. The pelleted diets were sun-dried, packed in a labelled polythene bag and stored until required.

Experimental design

Water was sourced from the University borehole and the experimental tanks were filled with 35 litres of water and two hundred and forty (240) *Clarias gariepinus* fingerlings (20 fish per bowl) were stocked into 12 experimental tanks, with each treatment and replicated twice. The fish were allocated randomly to the tank and the dietary groups of fish were fed at 3% body weight per day at 8.00 am and 5:00 pm for 8 weeks.

Organo-Somatic indices

The ratio of the weight of the liver, kidney, spleen and intestine with the bodyweight of fish was calculated separately from the following organo-somatic index formula (Olusola and Akinbiodun, 2021):

Hepatosomatic index (HSI) = (weight of liver (g)) x 100/ fish body weight (g)

Kidney-somatic index (KSI) = (weight of kidney (g)) x 100/ fish body weight (g)

Intestino-somatic index (ISI) = (weight of intestine (g)) x 100/ fish body weight (g)

Statistical analysis

Data were statistically analyzed using one – way analysis of variance (ANOVA). Duncan's Multiple comparisons among means were made when significant F = values were observed ($P < 0.05$), using SPSS version 20.

RESULTS

Phytochemical constituents of Giant Milk Weed (*Calotropis procera)*

The extracts were evaluated for the presence of flavonoids, tannins, glycosides, saponins, protein and amino, phenol, triterpenes and steroids. The different phytochemical components revealed the level of metabolites concentration which were recorded in table 1 as detected in small quantity (+) and moderate quantity (++) and present in abundance (+++).

Table 1: Determination of Phytochemical of *C. procera* leaves

Phytoconstituents	*C. procera*
Phenol	+
Saponins	+
Protein	+++
Tannins	+
Flavonoids	+
Triterpenes and Steriods	++
Glycosides	++

+ = detected in low amount ++ = detected in moderate amount +++ = detected in abundance.

Organo-Somatic index of C. gariepinus fed with the experimental diet for 8 Weeks

The value of liver was highest (2.05 ± 0.05g) in the fish fed 1.0% of CPM3-based diet and lowest (1.6 ± 0.95) in those fish in the control treatment. The result of the study shows that there was a general increase in the value obtained among the hepatosomatic and intestine somatic index and there were significantly different ($P < 0.05$) among the dietary groups except for kidney which shows no significant difference.

Table 2:Organo-Somatic index of *C. gariepinus* fed with the experimental diet for 8 Weeks

Parameters	Survival rate	Condition factor	Liver	Kidney	Intestine	Spleen
Before	ND	1.00 ± 0.00^{a}	0.90 ± 0.08^{a}	1.20 ± 0.06^{a}	1.30 ± 0.02^{a}	1.10 ± 0.08^{a}
Control (0%)	92.50 ± 2.5^{a}	1.18 ± 0.01^{b}	1.60 ± 0.95^{b}	0.17 ± 0.06^{a}	3.04 ± 0.01^{bc}	0.55 ± 0.03^{a}
CPM2 (0.5%)	92.50 ± 2.5^{a}	1.26 ± 0.02^{c}	1.90 ± 0.15^{bc}	1.10 ± 0.07^{a}	2.82 ± 0.32^{bc}	0.57 ± 0.05^{a}
CPM3 (1.0%)	90.00 ± 0.0^{a}	1.06 ± 0.03^{a}	2.05 ± 0.05^{c}	1.51 ± 0.87^{a}	2.63 ± 0.03^{b}	0.54 ± 0.11^{a}
CPM4 (1.5%)	92.50 ± 2.5^{a}	1.04 ± 0.00^{a}	1.96 ± 0.04^{bc}	1.26 ± 0.62^{a}	3.09 ± 0.04^{bc}	0.63 ± 0.06^{a}
CPM5 (2.0%)	95.00 ± 2.5^{a}	1.28 ± 0.09^{c}	1.80 ± 0.00^{bc}	0.90 ± 0.00^{a}	5.40 ± 0.02^{c}	0.90 ± 0.02^{bc}
OXYL (30mg/kg)	90.00 ± 10.0^{a}	1.07 ± 0.02^{a}	1.77 ± 0.17^{bc}	0.89 ± 0.06^{a}	2.99 ± 0.22^{bc}	0.59 ± 0.04^{ab}

Key: CPM =*Calotropis procera* Meal, OXYL = Oxytetracycline. ND = Not determined. The mean of duplicate data, mean value in each column with similar superscripts are not significantly different ($P > 0.05$)

DISCUSSION

The results of the phytochemical screening revealed the presence of flavonoids, tannins, glycosides, saponins, protein, phenol, triterpenes and steroids and were detected in different amounts, tannins and flavonoids presence were detected (+) in the plant sample (leaves), this result negates the report of Morsy *et al*., (2016) who reported that the flavonoids and tannins are not present in the leaves of *Calotropis Procera*. This could be due to the geographical localization of the plant or the extraction methods used. Phenols and glycosides were detected (++) in moderate amounts in the leaves and were aligned with the report of Soto *et al*., (2011); Shaker *et al*., (2010); Ahmed *et al*., (2005) who reported the presence of flavonoids, phenols, glycosides, Triterpenes, Steriods, and tannins. The result of the study shows that there is an increase in the value of organs among the dietary groups compared to the value of organs before the experiment. The liver is a considerable potential tool used by fish biologists to assess the toxicity situation of the exposure of fish to any toxicant as well as a management tool for evaluating the growth or health status of various fish species in different environments (Hoque *et al*., 1998). The significantly reduced value of kidney recorded for fish in CPR5(2.0%) inclusion could be linked with the reduction of the total body weight as a result of reduced appetite that was likely induced by inherent anti-nutrients. There was a general increase in the value of the intestine-somatic index (ISI) in all the dietary groups. This result disagrees with that of Abdel-Hameid, (2007) who reported that reduced ISI values for *O. aureus* juveniles could be associated with the reduction of the total body weight as a result of reduced appetite caused by phenol intoxication and there were significant difference ($P< 0.05$) in value of intestine, liver and spleen among the dietary groups.

The robustness and general well–being of the fish fed different graded levels of *C. procera* leaves meal–based diets as expressed by the condition factor (k) was best in CPM 5 (2.0% inclusion) while the least of robustness was recorded in CPM 4 (1.5% inclusion). There were significant differences ($P < 0.05$) among the dietary groups. All the fish were in better condition at the end of the experiment than they were at the beginning

CONCLUSION

However, from this study, it was observed that *C. procera* induced a positive impact on *C. gariepinus* fingerlings and it could be suggested that CPR2 (0.5%) could be added to fish feed to enhance the growth performance and survival of *C. gariepinus*

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