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Effects of Pawpaw Seed Powder as an Additive on Growth of Catfish Fingerlings Reared in an Indoor Tanks

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Abstract: Since the demand of African Catfish (*Clarias gariepinus*) is on increase there is need to increase its production so as to meet the protein requirement of the populace. An investigation was conducted for six weeks feeding trial to determine the performance of African catfish (*Clarias gariepinus*) fingerlings feed diets containing varying replacement level of fish meal with pawpaw seed powder meal (*Carica papaya*). Fingerlings of *Clarias gariepinus* were subjected to five different dietary treatments with varying levels of pawpaw seed powder meal. The diets I-V contained 0, 20%, 40%, 60% and 80% replacement levels, respectively. The experiment was carried out in an 80 litres circular plastic bowls, the treatments were in triplicate. Each bowl contained 12 fingerlings. Feeding was done at 3% body weight per day and fishes were weighed every week. Growth parameters such as specific growth rate (SGR), weight gained (WG), food conversion ratio (FCR), protein efficiency ratio (PER) and mortality were determined. Therefore, it could be concluded that fish meal could be replaced up to 80% with pawpaw seed powder meal in the diet of *Clarias gariepinus* fingerlings to encourage growth, while at 40% pawpaw seed powder meal inclusion mortality was reduced.

Key words: *Carica papaya*, *Clarias gariepinus*, mortality, growth parameter, fingerling

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Introduction

Pawpaw (*Carica papaya*) seed is a tropical herbaceous plant that grows between latitude 320° North and South. It contains appreciable amount of micro and macro nutrients required by fishes for growth and development, such as protein, carbohydrate, minerals, vitamins and fat content in little to no amount (FAO, 2001). The fruits, leaves, seeds and latex are used (Akah *et al*., 1997; Eno *et al*., 2000) as cures for many tropical diseases, hence, the common name "medicine tree" or "melon of health." The major active ingredients (*carpine*, *chymopapain*, *papain*, *bactericidal aglycone of glucotropaeolin benzylisothiocyanate*, *aglycoside*, *sinigrin*, the enzyme *myrosin*, and *carpasemine*) are in the black seeds (Akah *et al*., 1997; Eno *et al*., 2000; Wilson *et al*., 2002). The fleshy part of the fruits (*mesocarp*) is a delicacy and nutrient-rich drinks of high demand are produced from them. However, some of the active substances (*Carpine* and *Papain*) from pawpaw are toxic (Eno *et al*., 2000). *Carpine* is present in trace in the black seeds of papaya. In large quantities, it is said to lower the pulse rate and depress the nervous system. Externally the latex is irritant, *Dermatogenic* and *Vescicant*. Internally, it causes severe *gastritis*. Some people are allergic to the pollen, the fruit and the latex. *Papain* can induce asthma and rhinitis. The acid fresh latex can cause severe conjunctivitis and vesication.

These toxic seeds find their way into the aquatic

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environment through effluents from industries that use pawpaw fruits as raw materials for the production of juice and drinks (Akah *et al.*, 1997). The acute toxicity of a chemical can easily be evaluated in a short term test and death determines the end point. The presence of pawpaw seeds in water has been reported (Lohiya *et al.*, 2002) and the negative effects on aquatic life have been proven (Ayotunde and Offem, 2008). However, despite their widespread use, few is known about their toxicity to fishes.

The sharp tooth catfish, *Clarias gariepinus*, is of Nigerian fishing industry (Ita, 1980). These sharp tooth catfishes are frequently and widely cultured in ponds and occur freely in African natural freshwaters. The demand for this fish species by almost 75% of African population has necessitated the cropping of it in large number using poisons. The application of high level of pawpaw seed in the diets of fishes may lead to toxicity of the feed resulting to lower pulse rate and depression of the nervous system. Adverse response may be defined in terms of a measurement that is outside the normal range for healthy organisms, such as abnormal mortality, abnormal growth and reproduction (Lohiya *et al*., 2002).

The aim of this study was to determine the performance of pawpaw seed as an additive in the feeds of *Clarias gariepinus*.

Materials and Methods

Experimental unit

This experiment was carried out at the Department of Fisheries at the Laboratory of Delta State University Asaba Campus. Five experimental tanks of 4m x 4m, 800 litres were used for the experiment.

Experiment procedure

A total of 180 samples of *Clarias gariepinus* were purchased from Teaching and Research Farm of Delta State University. The fishes were transported immediately to the experiment site by using a plastic bucket. The initial average standard length, the total length and weight were taken to be 9.2 cm, 11 cm and 8.5 g, respectively. The fishes were randomly selected and put into five tanks containing fingerlings. The fishes were fed twice daily with commercial feed of 2 mm during this period. The fishes were starved for 2 days for transition period (to enable them get use to the locally formulated diet). Excretal matter and feed remains were removed from the water frequently and then replaced in fresh water.

Water quality management

Parameters to be monitored included temperature using mercury in glass-thermometer. Water was flushed thrice a week to ensure sufficient supply of oxygen and also check the bioaccumulation of toxic substances.

Dissolved oxygen and pH (hydrogen ion concentration)

Horiba U10 water checker was used to determine the amount of dissolved oxygen and pH (hydrogen ion concentration) in the water from each pond in the laboratory on a weekly basis.

Experimental diet formulation

Five different locally formulated diets with varying levels of pawpaw seed powder meal (PSPM) were used for feeding of the fish (Tables 1 and 2). The diets were labeled control diet Ⅰ (control), diet Ⅱ, diet Ⅲ, diet Ⅳ and diet Ⅴ. The diets were prepared by mixing all dried ingredients, according to formulation. Pawpaw seed powder meal (PSPM) was not added to diet Ⅰ which was control diet. Pawpaw seed powder was added to diet Ⅱ, diet Ⅲ, diet Ⅳ and diet Ⅴ, at the following concentration 20, 40, 60 and 80 $g \cdot kg^{-1}$, respectively.

All the mixtures were thoroughly mixed to ensure homogeneity. The wet mixtures were pelleted using a 2 mm disc attached to the pelleting machine. The prepared diets were sundried and the pellets packed in labeled polythene bags, sealed and stored at room temperature (25℃).