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EFFECT OF ETHANOLIC EXTRACT OF BLACK PEPPER (*Piper nigrum)* ON PRESERVATION OF AFRICAN CATFISH (*Clarias gariepinus)*

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ABSTRACT

Fish preservation is an important stage of fish production as it helps in the reduction of post-harvest losses. This leads to the study of ethanolic extract of black pepper as a preservative of African catfish. A sample size of five (5) fish of average weight 600g for each treatment were slaughtered and gutted before they were dipped in the black pepper extract for 10minutes and 20 minutes in separate bowls. The fish samples that had been preserved with the plant extract were monitored for spoilage at an interval of four (4) hours for the period of forty eight (48) hours and the organoleptic characteristics were observed and recorded. The shelf life of the experimental African catfish was extended from 20 hours as seen in the unpreserved sample to between 24 – 26 hours in the preserved sample. The study also indicated that the duration of dip did not have any effect on the preservative action of black pepper seed extract and this was because the extract was only able to extend the shelf life of the sample to 24 – 26 hours before becoming unfit for consumption at 28 hours for both the 10 and 20 minutes dipping durations. It can therefore be concluded from the findings of this research that African catfish can be preserved using natural preservatives (plants) and thereby reducing post-harvest losses.

Key words: Black pepper seeds, preservation, African catfish, ethanol and extract.

INTRODUCTION

Fish is a major source of food providing a significant portion of the protein intake of a large proportion of the people, particularly in developing countries. In Nigeria, fish is the preferred source of high quality animal protein compared to pork or beef with little or no religious rejection bias against it (Ephraim, 2010). Fish has the highest protein profile of essential sulphur-containing amino acids such as cysteine, Methionine and lysine which are limiting in some legumes and most cereals-based diets (Ephraim, 2010).

Food quality and safety remains concerns of mankind since the dawn of history, and in recent years there have been increasing disquiet on the part of government, food processors and consumers (WHO, 1995). Fish is regarded to be a highly perishable commodity, more than cattle, sheep, and poultry. Therefore, unless fish is disposed quickly after capture, it must be preserved in some way. In Nigeria, only a negligible proportion of the fish caught in rivers and lakes is marketed fresh, while greater portion are preserved by smoking and sun drying (Ikeme and bhandary, 2001).

Food preservatives and antioxidants are used to prolong the shelf life of food either by killing microorganisms or controlling their growth in food. They are also preserved by preventing or retarding the oxidative deterioration of food (ligia, 2002). Synthetic antioxidation has been prohibited in many countries of the world because of their undesirable effect on the enzymes of the liver and lungs (Ikeme and Bhnadary, 2001). This has paved way for the extensive use of natural preservatives and anti-oxidants such as spices, fruits (stems, peels and seed) and other plants in the prevention of spoilage, mainly by microorganisms that naturally inhabit the fish flesh in fresh and smoked fish.

Black pepper (*Piper nigrum L.*) is a medicinal and aromatic liana that originated in India, and was first introduced to China in 1947. At present, this vine is widely planted in Hainan. The cultivation acreage and yield of pepper rank sixth and fifth worldwide, respectively, with an output of 35,000 tons (Ravindran and Kallupurackal 2012). Pepper is not only used as a spice, but also as a medicinal material. Pepper extracts contain alkaloid (e.g. piperine), terpenes, flavones and volatile oils (e.g. piperyline) that exhibit sedating, detoxification, hypotensive, and anticancer activities (Butt *et al* , 2012; Meghwal and Goswami, 2013; Yoon *et al*, 2015). Pepper is also used as a preservative and flavor, enhancer in meat and meat-based products (Thiel *et al.* 2014).

MATERIALS AND METHODS

Study location

The study was carried out at Muhd I.U. farms (Gidan kifi plaza), Guringawa quarters which is located in Kumbotso Local Government Area of Kano State. Kumbotso is situated within Kano metropolitan. It lies on the geographical coordinates of 11^0 53’ 17’ N, 8^0 30’ 10” E. (NPC, 2006).

Experimental fish

The fish samples (*Clarias gariepinus*) were collected from the fish production pond at Muhd I.U. farms (Gidan kifi plaza), Kumbotso, Kano State for the shelf life studies. A sample size of five (5) fish for

each treatment were slaughtered and gutted before they were dipped in the black pepper extract for 10minutes and 20 minutes in separate bowls. The table used was washed and cleaned with ethanol. The average size of the fish samples were 600g.

Collection and preparation of black pepper

The black pepper used for the experiment was sourced from sheka market, Kano state and was weighed using a sensitive weighing balance. The black pepper seed extract was washed and grinded into fine powder, the extraction was carried out as follows:

Extraction and isolation

Four hundred (400g) gram of the collected black pepper was blended and soaked in 200mls of ethanol for 1hour. The pulp obtained was poured into clean sterile glass container and shaken vigorously to allow for proper extraction. Filtration was done using a sterile muslin cloth after which the extract obtained was air-dried and stored before use. (Azu and Onyeagba, 2007).

Preservation of fish using extract

The fish samples were preserved in 200ml plant extract diluted in 15litres of water for 10 and 20 minutes separately. They were monitored for spoilage at an interval of four (4) hours for the period of forty eight (48) hours and the organoleptic characteristics were observed and recorded.

RESULTS AND DISCUSSION

Tables 1, 2, and 3 indicate the different organoleptic indices of the experimental fish during the study period. Table 1 shows the different organoleptic characteristics of catfish (*Clarias gariepinus*) monitored at the interval of four (4) hours at ambient temperature. Table 2 and 3 represent the four (4) hourly organoleptic properties of catfish (*Clarias gariepinus*) dipped in the black pepper seed extract for 10 and 20 minutes, respectively.

Table 1: Organoleptic characteristics of African catfish (*Clarias gariepinus)* monitored at the interval of four (4) hours at ambient temperature.

Periods	Eyes	Gills	Skin	Flesh
0hrs	Convex, dark pupils cornea, iridescent	Bright, Fresh odour	Bright grey at dorsal region,silvery at ventral region	Firm
4hrs	Convex, Loss of brightness	Pale red, Fresh Odour	Pale red at Dorsal region	Firm
8hrs	Convex, Cloudy and cornea	Reddish, fresh odour	Dark red at dorsal region dry at ventral region	Firm
12hrs	Flat, cloudy and slightly sunken	Bleached, neutral odour	Dark red at dorsal region red at ventral region	Firm
16hrs	Flat	Bleached, very sour	Reddish brown at dorsal region	Less Firm
20hrs	Black pupil, grey cornea	Sour	Brown at Dorsal region	Less Firm
24hrs	Convex, Black pupil	Pale White, Very Sour	Dark red at dorsal region at ventral region	Neither firm nor soft
28hrs	Very Sunken	White rancid	Dark red at dorsal region and red at ventral region	Soft
32hrs	Black Sunken or Concave	White very sour / rancid	Dark red at dorsal region and red at ventral region	Very Soft leaves finger indentation
36hrs	Concave white pupil grey cornea	Pale Greenish, very sour and strong rancid	Dark grey at dorsal region and grey at ventral region	Soft No elastic

Table 2: Organoleptic characteristics of African catfish (*Clarias gariepinus)* preserved in black pepper seed extract for ten (10) minutes.

Period	Skin	Eyes	Gills	Flesh
0hrs	Bright, Shining, clear mucus, firm belly	Transparent, clear, protruding iridescent, white cornea dark pupil	Bright red, fresh odour	Firm, Flexible elastic
4hrs	Bright shining, clear mucus, firm belly	Protruding, loss of brightness white cornea, dark pupil	Dark red, fresh odour	Firm Elastic
8hrs	Bright, Shining clear mucus, firm belly	Protruding, loss of brightness white cornea, dark pupil	Dark red, Fresh odour	Firm Elastic
12hrs	Dull, Soft Belly	Flat, White and slightly cloudy pupil	Bleached, Neutral odour	Less Firm slightly elastic
16hrs	Dull, Soft belly	Convex opaque grey cornea	Bleached, Neutral Odour	Less Firm slightly elastic
20hrs	Dull Less Firm	Convex, Opaque grey cornea	Bleached, Neutral odour	Less Firm Slightly Elastic
24hrs	Dull, Less Firm	Convex, opaque grey cornea	Bleached, neutral odour	Less Firm slightly Elastic
28hrs	Dull, Less Firm	Sunken, opaque grey cornea	Brown, Neutral sour	Soft, Slightly Elastic
32hrs	Dull, very soft leaves finger indentation	Sunken, Opaque Grey Cornea	Very Sour, Brown colour	Soft, Slightly Elastic
36hrs	Dull, Soft belly	Sunken, Opaque Grey Cornea	Very Sour, Brown Colour	Soft, Slightly Elastic
40hrs	Slime thicken and turn turbid, dull	Sunken, opaque grey Cornea	Pale Green rancid odour	Soft, Non elastic
44hrs	Slime Thicken and Turn turbid	Very Sunken	Putrid Odour	Soft Non elastic
48hrs	Slime Thicken and turn turbid	Sunken	Putrid odour greenish	Soft Non elastic
48 hrs	Slime thicken and turns turbid dull	Sunken	Greenish colour	Soft non elastic
40hrs	Very Sunken or Concave	Greenish ammoniacal odour	Dark grey atdorsal region and red at ventral region	Very soft and flabby

Table 3: Organoleptic characteristics of African catfish (*Clarias gariepinus)* preserved in black pepper seed extract for ten (20) minutes.

Period	Skin	Eyes	Gills	Flesh
0hrs	Bright, Shining, clear mucus, firm belly	Transparent, clear, protruding iridescent, white cornea dark pupil	Dark Red	Less Firm, Elastic
4hrs	Bright, Shining, clear mucus, firm belly	Transparent, clear, protruding iridescent, white cornea, dark pupil	Dark red	Firm, Flexible Elastic
8hrs	Bright, Shining Clear Mucus, Firm belly	Protruding, Loss of Brightness white cornea, dark pupil	Dark Red	Firm, Flexible elastic
12hrs	Dull, soft belle	Flat, White and slightly cloudy pupil	Brown colour	Firm, flexible elastic
16hrs	Dull, soft belle	Sunken opaque grey cornea	Brown colour	Soft, slightlt elastic
20hrs	Dull, soft belle	Sunken opaque gray cornea	Greenish colour	Soft, non elastic
24hrs	Dull, soft belle	Sunken opaque gray cornea	Brown colour	Soft non elastic
28hrs	Dull, soft belle	Sunken opaque gray cornea	Brown colour	Soft non elastic
32 hrs	Dull, soft belle	Flat, white and slightly colour pupil	Brown colour	Soft non elastic
36hrs	Dull, soft belle	Sunken opaque gray cornea	Brown colour	Soft non elastic
40hrs	Slime thicken and turns turbid dull	Sunken	Greenish colour	Soft non elastic
44hrs	Slime thicken and turns turbid dull	Sunken	Bleached colour	Soft non elastic

The shelf life of African catfish was extended from 20 hours as seen in the unpreserved catfish (Table 1) to between 24-26 hours in the catfish preserved in black pepper seeds extract (Table 2 and 3). The unpreserved catfish was fit for consumption till 20 hours post slaughter unlike the observation of Kazeem (2007) and Ephraim (2010) who monitored catfish post slaughter at ambient temperature and found that it was fit for consumption till 24 hours post slaughter. This variation may be attributed to the environmental factors as the experiments were performed in different environments.

It was observed from the study that the duration of dip did not have any effect on the preservative action of black pepper seed extract and this is because the extract was able to extend the shelf life of catfish to 24-26 hours before it became unfit for consumption at the 28 hours post slaughter for both the 10 and 20 minutes dipping duration. This observation agrees with the findings of Ephraim (2010) who determined the quantity of antimicrobial compounds in ethanol extract of grape fruit peel extract, black pepper and paw-paw seed extracts. Ethanolic extract of black pepper seeds which contained 2.6% alkaloids had a better antimicrobial activity on catfish spoilage compared to the ethanolic extracts of grape fruit peel (9%) and paw-paw seed (7.6%).

CONCLUSION AND RECOMMENDATIONS

This research revealed that black pepper seed extract only requires a contact with fish for some time and it will exhibit its preservative action. Thus, the deduction from this observation is that black pepper seed extract does not require long duration and very high quantities of the antimicrobial compound for its activity. It can be concluded from this study that black pepper seed extract is a yet to be exploited natural preservative for catfish which can help in reducing fish post-harvest losses. It is therefore recommended from the result of this study that fish mongers that deal with live fish could dip the fish in black pepper extract seed immediately after slaughter to extend the pre-rigor stage in fish, while large scale production of the extract is also recommended.

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