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EFFECT OF SOME NIGERIAN SPICES ON BIODETERIORATION OF TILAPIA AND CAT FISHES

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ABSTRACT

This research is in two phases, one phase investigated the use of spices to inhibit the quick deterioration of fish. Spices used ere Xylopia aethiopica, Capsicum frutescens, Zingiber officinale, Piper guineense. Fishes used were Clarias gariepinus and Tilapia guineensis. Blended spices were applied on the fishes and kept for three days in an airy cage and the weights of fishes for each day were recorded. The second phase of this research monitored the preservation capabilities of the spices as a function of preservation time. This was determined by carrying out proximate analysis on the fish samples. Results showed the preservative capability of the fish samples by the four spices. The weights of the control of tilapia and catfish were 541.70 and 152.52g respectively, before scaling. Both weights reduced significantly after scaling and further reduced by the 3rd day of their preservation to 363.194 and 104.405g respectively. The weights of tilapia and catfish preserved with C. frutescens were 93.00 and 117.90g respectively, before scaling. Both weights reduced significantly after scaling and further reduced consistently from the 1st day up until the 3rd day of preservation to 61.810 and 82.288g respectively. The weights of tilapia and catfish preserved with P. guineense were 87.62g and 148.29g respectively, before scaling. Both weights reduced significantly after scaling and further reduced consistently from the 1st day of preservation to the 3rd day of preservation, with the only exception being a significant decrease, from 84.16 to 94.639g of catfish preserved with P.guineense from the 2nd to the 3rd day of preservation, with this same scenario for tilapia and catfish preserved with X.aethiopica. Measures such as action to control the moisture, good sanitary conditions in the processing of food must be taken, as well as the use of dry powdered ginger sample for future research.

Key words: Dry powdered ginger, inhibit the quick deterioration.

INTRODUCTION

Tilapias are shaped much like sunfish and crappie but can be easily identified by an interrupted lateral line characteristics of the cichlid family of fishes. They are laterally compressed and deep-bodied with long dorsal fins. Strains of resistant food-borne pathogens to a variety of antimicrobials have become a major health concern (Kiesslinget *al.*, 2002). Changes in the microbial target, inactivation by enzymes, changes in cellular permeability, antimicrobial active efflux, overproduction of target enzymes and bypass of the antimicrobial resistance form the hallmark of food biodeterioration (MacKeeganet *al.*,

2002). Plant products with antimicrobial properties have been applied in food production to prevent bacterial and fungal growth (Lanciotti*et al.*, 2004). Proximate analysis is a system of analysis of nutrients also termed "conventional analysis" in which the gross components (protein, fat, carbohydrate, ash, etc) of a food material rather than individual nutrients (amino acids, fatty acids, monosaccharids, minerals, etc) are determined. This study sought to know the effect of some Nigerian spices on biodeterioration of tilapia and cat fishes.

MATERIALS AND METHODS

Collection and Preparation of Samples

The samples *Xylopiaaethiopica*(guinea pepper), *Zingiberofficinale* (ginger), *Capsicum frutescens*(bird pepper), *Piper guineense*(climbing black pepper) were obtained from oil mill market in Port Harcourt, Nigeria. The samples *Tilapia guineensis* and *Clariasgariepinus*were purchased from Choba junction, beside Sammies and Elion farm (No. 12 OhondaAmaechule close, Psychiatric Road, Rumuigbo) respectively, both in Port Harcourt, Nigeria. The spices were identified at the Plant Science and Biotechnology Department of the University of Port Harcourt, and the fish samples were identified in the African Regional Aquaculture Centre (ARAC) OmuihuechiAluu, Port Harcourt, Nigeria. *C. frutescens, P.guineense*and *X.aethipica* were dried and ground to powdery form using a blender and stored in air-tight bottles as stock samples. The *Z.officinale* samples were peeled, washed and blended for immediate use. The catfish and tilapia samples were weighed and dressed by descaling (as in tilapia) and removal of offals and the dressed fishes reweighed. Fish samples after the 3 days deterioration were dried in an oven and crushed to be used for proximate analysis.

Determination of Preservation Capability of Spices

Ground spices were applied on the prepared fish samples and kept in an airy cage to achieve preservation of the fish. At subsequent days, the fish samples were weighed and weights recorded.

The parameters assayed include crude protein, moisture content, ash content, carbohydrate and lipid content. Crude protein was determined using the macro-kjeldahl method which involves three stages; digestion, distillation and titration. The percentage crude protein is 6.25 times of the percentage nitrogen.Total carbohydrate was determined using the ClagAnthrone method. The formula; % carbohydrate as glucose $= \frac{25\ X\ Absorbance\ of\ sample}{Absorbance\ of\ standard\ glucose\ X\ sample\ wt.}$ is used to calculate total carbohydrate. Crude lipid was determined using the Soxhlet Extraction method. % lipid was calculated using the formula below;

$$\%\ Crude\ lipid = \frac{Weight\ of\ flask\ containing\ extract - weight\ of\ flask}{Weight\ of\ sample\ (g)}\ X\ \frac{100}{1}$$

The Ash content was determined using the loss on Ignition method. The percentage ash content was calculated using the formula;

$$\%\ Ash = \frac{Weight\ of\ Ash}{Sample\ weight}\ X\ \frac{100}{1}$$

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Weight of Ash → weight of porcelain crucible + ash – weight of porcelain crucible.

The Moisture Content was determined using the Air – oven method. The calculation for percentage moisture is done using the formula;

$$\%\ Moisture\ content = \frac{Weight\ of\ foil + sample\ before\ drying - Weight\ of\ foil + SV\ after\ drying}{Sample\ weight}\ X\ \frac{100}{1}$$

Statistical Analysis

The data were statistically analyzed with the one way ANOVA, to test for differences between treatment groups using Statistical Package for Social Sciences (SPSS) version 16, at 95% confidence level. A p value of <0.05 was considered statistically significant. All data were expressed as standard error of means.

RESULTS

The results obtained for the weights of the fish samples for the days during the preservation, to indicate fish deterioration are shown in Table 1.

Table 1: Weights of the fish samples in different times

S/No.	Sample	Before dressing (g)	After dressing (g)	1st day (g)	2nd day (g)	3rd day (g)
1.	TILAPIA (control)	26.170	24.070	19.359	15.673	10.236
2.	TILAPIA (with *Capsicumfrutescents*)	22.333	19.563	14.912	11.005	8.021
3.	TILAPIA (with *Piperguineense*)	23.042	20.128	15.129	11.683	8.452
4.	TILAPIA (with *Zingiberofficinale*)	24.774	20.853	15.467	11.389	8.233
5.	TILAPIA (with *Xylopiaaethiopica*)	21.748	18.257	14.026	11.018	8.004
6.	CATFISH (Control)	26.018	25.162	23.946	21.647	20.163
7.	CATFISH (with *Capsicumfrutescents*)	25.947	24.173	22.178	21.901	20.533
8.	CATFISH (with *Piperguineense*)	24.485	21.459	19.024	16.834	14.300
9.	CATFISH (with *Zingiberofficinale*)	23.478	20.994	18.378	16.295	15.128
10.	CATFISH (with *Xylopiaaethiopica*)	23.174	20.847	17.912	17.015	16.389

In the determination of moisture content, of the Tilapia fish samples were found to range from 5.333% for the tilapia with Zingiberofficinale to 26.170 for control and that of catfish was found to range from the control with 0.152 to 3.128 for Tilapia with Piper guineense and that of catfish was found to range from 0.071 for catfish with Capsicum frutescens to 1.533 for catfish with Piper guineense. In the analysis of lipid, the lipid content of tilapia fish was found to range from 8.233 for tilapia with Zingiberofficinale to 22.333 for Tilapia with Capsicum frutescens and that of catfish was found to range from 14.300 for catfish with Piper guineense to 20.533 for catfish with Capsicum frutescens.

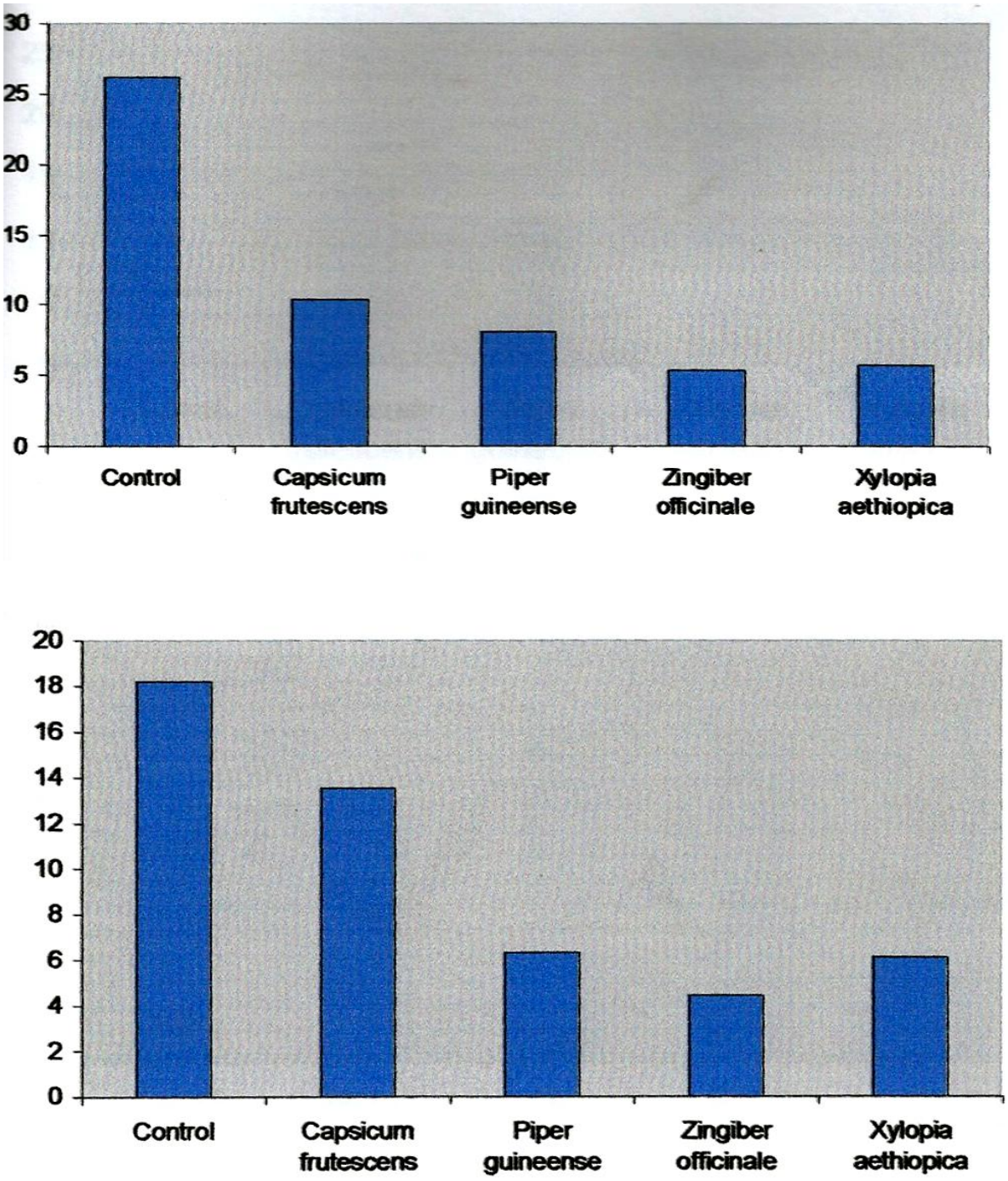

Fig. 1. Moisture contents of tilapia and catfish

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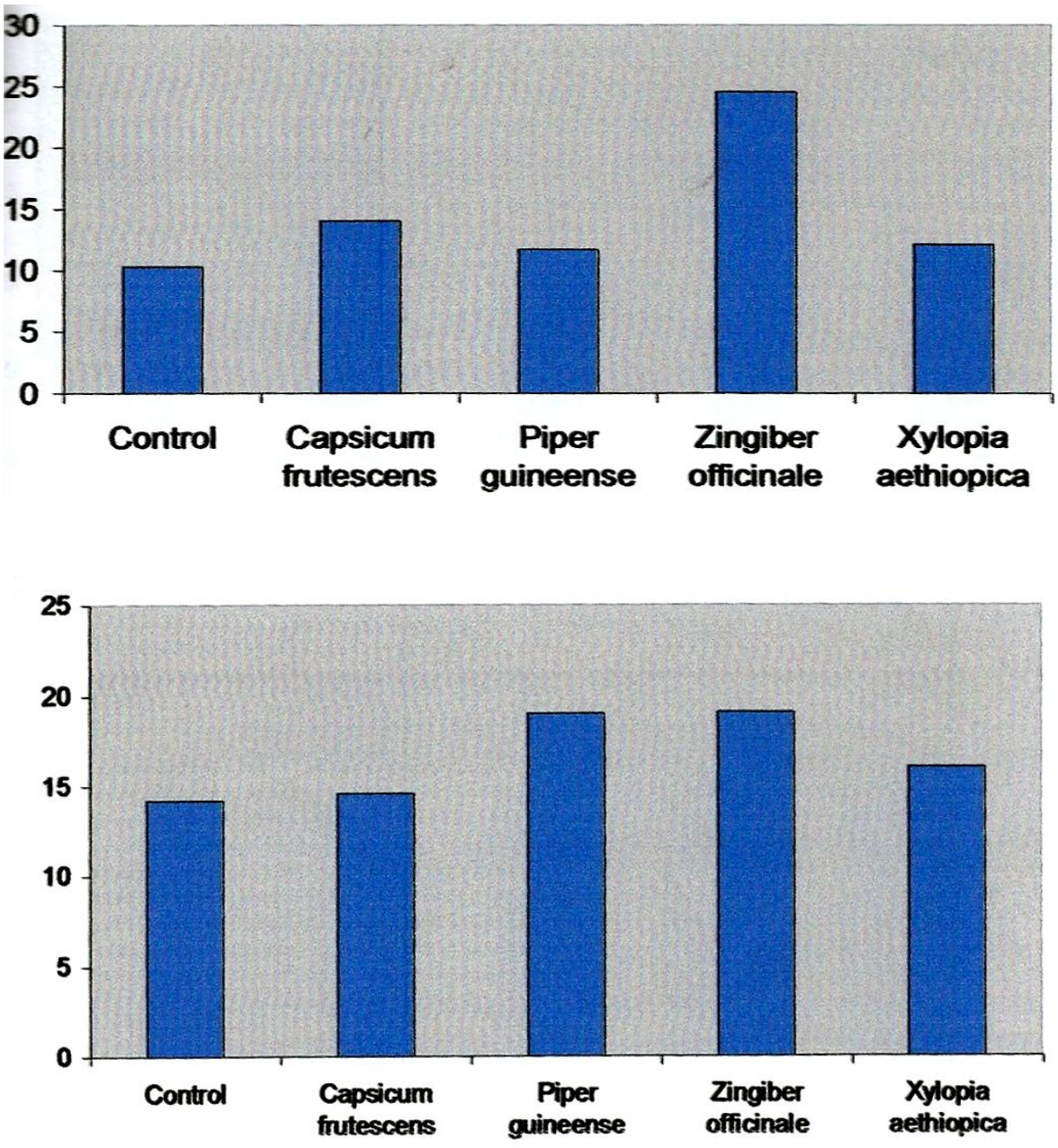

Fig. 2. Ash contents of tilapia and catfish.

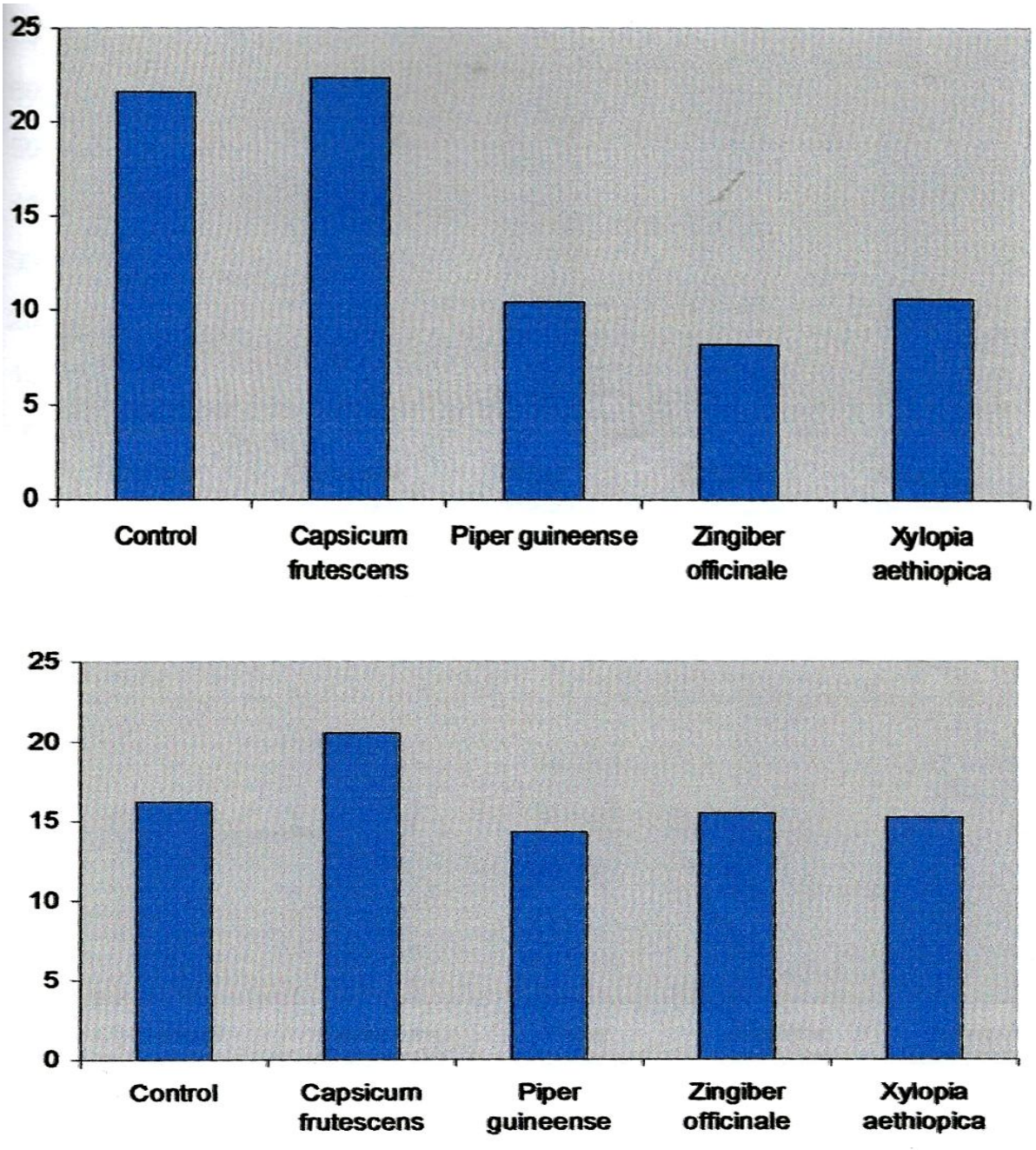

Fig. 3. Lipid contents of tilapia and catfish.

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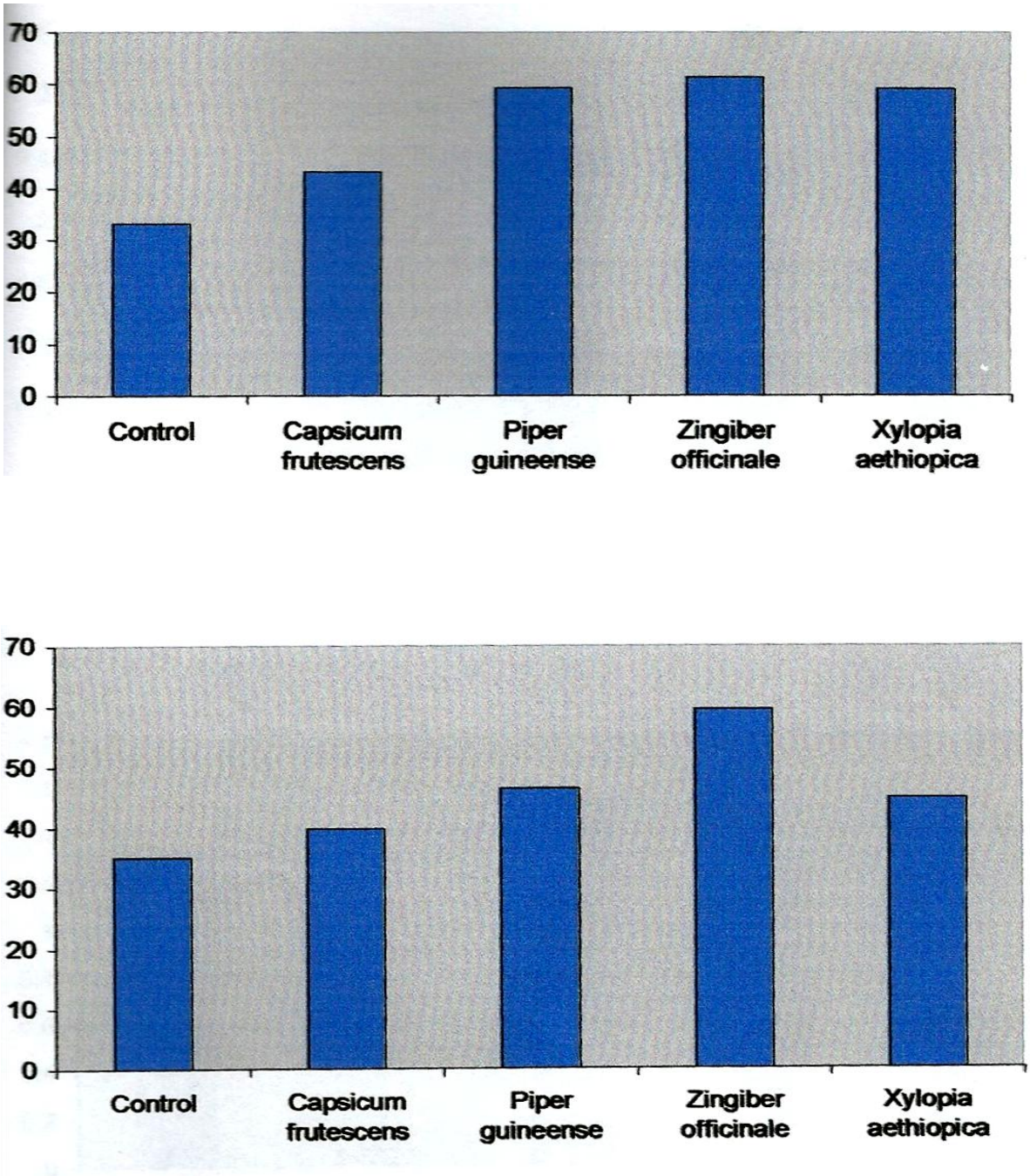

Fig. 4. Protein contents of tilapia and catfish.

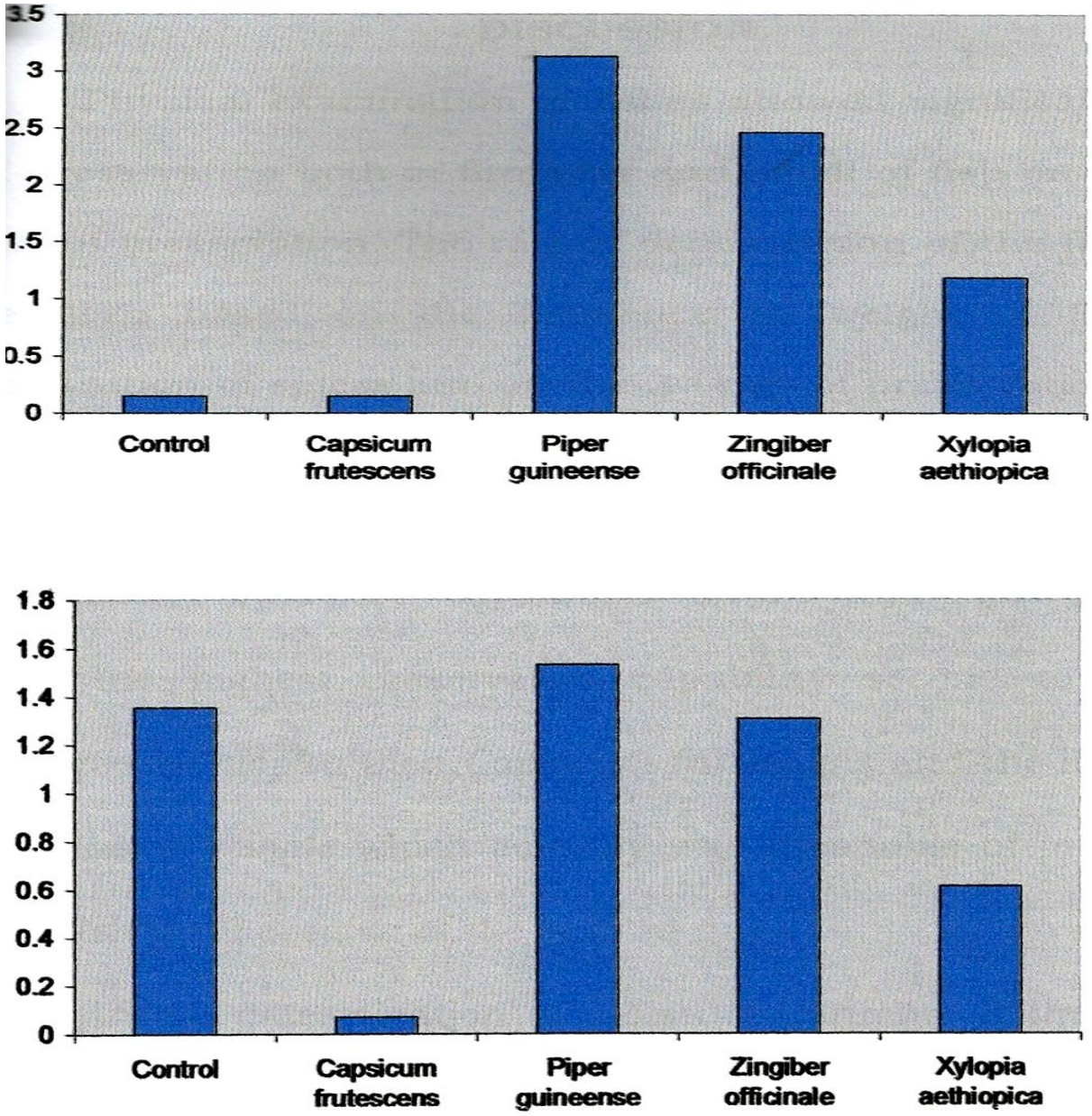

Fig. 5. Carbohydrate contents of tilapia and catfish

DISCUSSION

Experiment shows that *Piperguineese*has the highest preservative capability second to it was *Xylopiaaethiopica*then *Capsicum frutescens* and the least was *Zingiberofficinale* which actually was incapable of preserving the fish until evening of the second day.

Comparing the control samples and the preserved samples, it is seen that the preservation capabilities of the spices differ and also according to the species of fish as evident on the nutrient content. The result of this study is similar to the findings of Farag*et al.*,(2008). The antimicrobial activity of spices depends on the type of spices. From this experiment, *Z. officinale* had the lowest preservative capability.

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The results of the proximate analysis can be related to the finding that Tilapia is very nutritive and persons consuming it are more resistant to viral, bacterial and parasitic attack than persons consuming other commonly cultured fish (Thomas Popman and Michael Master, 2009) but in this study, it would be said thatTilapia is very nutritive and persons consuming it are more resistant to viral, bacterial and parasitic attack than persons consuming catfish.

Antimicrobial activity of spices could be recognized as important factor for providing their inclusion in food conservation and preservation systems when pertinent measures are taken to assure their satisfactory microbiological quality. These measures must include action to control the moisture, good sanitary conditions in their processing. The use of dry powdered ginger sample is recommended for future research on this same topic.

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