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MICROBIOLOGICAL EVALUATION OF SHELFLIFE INDICES OF FERMENTED AFRICAN LOCUST BEAN CAKE STORED UNDER DIFFERENT PRESERVATIVE TREATMENTS

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ABSTRACT
This study was carried out on the preservation of fermented Parkia biglobosa Seeds sourced from Local Producers and laboratory produced. The local and fermented laboratory controlled samples were treated with 0.5ml of freshly prepared ginger extract. Another set of control was left untreated. The samples were stored at ambient temperature for 30 and 120 days. Contaminant isolates were identified from locally produced, laboratory treated and untreated (Control) using standard procedure. The analysis consisted of Aerobic and Anaerobic mesophilic count, Staphylococcus count and fungal count, detection of E. coli, S. aureus, Salmonella sp, Mucor sp and Rhizopus sp. The proximate analysis and organoleptic assessment of the purchased, Laboratory treated and laboratory untreated (control) were carried out using standard procedure at 30 and 120 days. Isolated and characterized bacterial isolates at 30 and 120 days in the treated and control locust bean cake were E.coli only isolated in Kwanar yandaddawa, Staphylococcus aureus was isolated in all the purchased Locust bean cake, Salmonella sp was not detected and a predominant fungal species were Mucor and Rhizopus. There was log reduction between 30 and 120 days treated locust bean cake; the Control shows Log increase. The mean proximate composition percentage differences between 30 and 120 days shows nutritional quality of treated locust bean cake. Organoleptically, the judges rejected control daddawa as a result of what the panelist termed as "unpalatable taste and partially pleasant aroma" due to off flavor. The growing interest in use of natural products of plant origin therefore gives Ginger extract an advantage in developing a practical approach for the preservation of African locust bean cake.
Keywords: African locust bean cake, preservatives, log reduction, nutritional quality, shelf life.

INTRODUCTION

Omafuvbe (2002) stated that the fermented locust bean seed is commonly consumed in Ghana, Nigeria, Sierra-Leone and Togo. In Nigeria it is called iru in Yoruba, dawadawa in Hausa and ogiri `igala in Igbo. It is also referred to as kinda in Sierra-Leone and kpalugu in Ghana. They are also important protein supplement (Omafuvbe, 2002). Shelf life is the period of time during which the food product was remain safe , be certain to retain desired microbiology, physical, chemical and sensory characteristics and comply the nutritional data when stored under conditions (temperature or handling) Kolapo *et al.*, (2007).

MATERIALS AND METHODS

The purchased daddawa were obtained from Gude, Jogana and Kwanar yandaddawa. Laboratory Production of Standard Daddawa Used as Controlled Condiment according to the method of (Gberikon and Agbulu, 2015). The local and fermented controlled samples were treated with 0.5ml of freshly prepared ginger extract,the laborarory control was left untreated (Kolapo et al 2007).Microorganisms Associated With Daddawa Product were isolated and characterized according to the methods of (FAO, 1992).The microbiological quality (Aerobic mesophilic count, Anaerobic mesophilic count, *Staphylococcus* count and Fungal count) were determined according to the method of (FAO, 1992). The Sensory Quality of the products were determined according to 9 – point Hedonic scales (David, 2005).

RESULTS AND DISCUSSION

Isolated and characterized bacterial isolates at 30 and 120 days in the treated and control fermented African locust bean cake were *E.coli* only isolated in Kwanar yandaddawa

The occurrence of *E. coli* in Kwanar Yandaddawa might be attributed to use of recent feacally contaminated water in the Daddawa preparation or could be due to unhygienic activities of the Daddawa/Food handlers. Bukar *et al.,* (2009) reported that 5(10.0%) out of 50 food handlers in three small scale industries in Kano Metropolis investigated carried *E. coli* on their hands. *Staphylococcus aureus* was isolated in all the locally purchased Locust bean cake. The *Salmonella* sp (0 %) was not detected in the Laboratory treated, control (laboratory untreated) and purchased Daddawa. . Salmonella specie has been reported to be transmitted via water and salmonella carriers as food handlers (Bukar *et al.,* 2012). At 30 days *Mucor* sp and *Rhizopus* sp were the predominant fungal species, this is in line with the findings of Rabi *et al.,* (2013), at 120 days *Mucor* sp and *Rhizopus* sp were detected only in Control Daddawa .The result indicated 40 % elimination of contaminants at Gude, Jogana and Kwanar yandaddawa. It was observed that there was microbial log reduction between 30 days and 120 days. This is actually due to the fact that the samples treated with ginger extract experience moisture reduction which discourage microbial growth and proliferation. These findings are consistent with the works of earlier investigator (Kolapo *et al.,* 2007) who also observed microbial reduction in the treated locust bean cake and microbial increased in the untreated sample of Daddawa. The mean proximate composition percentage differences between 30 and 120 days shows nutritional quality of treated locust bean cake The sensory evaluation of the treated samples indicated the effect of the treatments samples which extended the shelf life of treated samples to 120 days. The organoleptic assessment shows that the judges rejected Laboratory untreated (Control) as a result of what the panelist termed as “unpalatable taste and partially pleasant aroma” due to off flavor.

Table 1: Percentage elimination of bacteria on locust bean cake treated with ginger extract at 30 and 120 days.

S/N	Site	Ginger extract treated samples at 30 days					% rec	Ginger extract treated samples at 120 days					% rec	% eli
		E.coli	*S. aureus*	*Sal*	*Mc*	*Rh*		*E.coli*	*S. aureus*	*Sal*	*Mc*	*Rh*		
1	Laboratory treated daddawa	-	-	-	-	-	0	-	-	-	-	-	0	0
2	Laboratory Untreated Daddawa (Control)	-	-	-	+	+	40	-	-	-	+	+	40	0
3	Gude	-	+	-	+	+	60	-	+	-	-	-	20	40
4	Jogana	-	+	-	+	+	60	-	+	-	-	-	20	40
5	Kwanar yan daddawa	+	+	-	+	+	80	+	+	-	-	-	40	40

Key: Sal = Salmonella, Mc = Mucor sp., Rh = Rhizopus sp., rec = recovery, eli = elimination

Table 2: Microbial $\log_{10}$ reduction count between 30 and 120 days of ginger extract treated African locust bean cake from local manufacturers and the laboratory prepared cake

	Aerobic Mesophilic Count	Anaerobic Mesophilic count	Staph count	Fungal count
Gude	0.34	0.3	0.38	0.35
Jogana	0.32	0.26	0.3	0.27
Kwana	0.39	0.37	0.29	0.3
Lab Treated Daddawa	0.3	0.31	0.35	0.21
Lab Untreated (Control)	0.02*	0.01*	0.01*	0.03

* Values with asteric within a column Indicates Log Increased, Values without asteric within a column Indicates Log decreased.

Table 3: Difference between 30 and 120 days Mean Proximate Composition of African Locust Bean Cake treated with Ginger extract

	Moisture	Ash	Crude fat	Crude protein	CHO	Crude fibre
Gude	1.81	1.56*	4.82	2.68*	1.69*	0.69*
Jogana	2.49	1.69*	4.71	2.15*	1.48	1.75
Kwana	2.88	2.12*	4.98	4.63	8.58*	1.82*
Lab Treated Daddawa	3.48	2*	7.22	5.01*	2.9*	0.81*
Lab Untreated (Control)	1.69*	1.04	5*	2.38	1.23	2.04

* Values with asteric within a column indicated proximate value increased.
Values with asteric within a column Indicates Log decreased.

Table 4: Distribution of Responses on HEDONIC SCALE for Ginger Extract Treated and Untreated African Locust Bean Cake at 120 Days.

		Purchased			Laboratory	
		Gude	Jogana	Kwanar yandaddawa	Treated	Untreated
Option	Scale	A	B	C	D	E
Like extremely	9	3		4	2	
Like very much	8	3	3	2	3	
Like moderately	7		1	1		
Like slightly	6	2	5	3	3	
Neither like nor dislike	5	2	1			4
Dislike slightly	4				2	2
Dislike moderately	3					1
Dislike very much	2					3
Dislike extremely	1					
Mean ± Standard deviation		7.3± 1.5	6.5± 1.34	7.7± 1.27	6.8± 1.78	9.25± 1.46
Total response		10	10	10	10	10
% Dislike		0	0	0	20	60

KEY
A = Ginger extract Gude; B = Ginger extract Jogana ; C= Ginger extract Kwana ; D= Laboratory Ginger extract Treated ;E=Laboratory Ginger extract Untreated (Control)

CONCLUSION

Natural preservatives tends to improve the shelf life of processed *P. biglobosa* seeds by reducing the number of microbial load on the samples which could have been agents of deterioration or spoilage to the sample and reduce the shelf life.

Recommendation

However, further studies are needed for preservation of processed *Parkia biglobosa* seeds using more natural preservatives coupled with packaging in order to extend the shelf life of the product.

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