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Review Article

Physico-Chemical Properties of Soursop Yoghurt Preserved with African Cardamom and Turmeric

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ABSTRACT

Yoghurts are among the common dairy products consumed in Nigeria, but not much has been done on non-dairy yoghurt source and this has attracted the present study. Yoghurts from both sources are highly susceptible to deterioration during storage. Natural preservatives are preferred to synthetic ones due to the latter hazardous to human health. This research was designed to evaluate potential of African cardamom and turmeric, local spices, in preservation of soursop yoghurt. Juice was produced from soursop fruit and processed into yoghurt using standard methods. Soursop yoghurt was preserved by adding equal proportion mixtures of aqueous extracts of African cardamom and turmeric at 1.0%, 1.5%, 2.0% and 2.5% concentration and control sample had no spice. The soursop yoghurt was analyzed for physic-chemical parameters for twelve weeks at refrigerated temperature. Data were analyzed using ANOVA at ($p< 0.05$). Soluble solids and pH decreased, while total titrable acidity increased at 2.0% and 2.5% concentration in the soursop yoghurt samples as storage period increased. Mixture of aqueous extracts of African cardamom and turmeric preserved refrigerated soursop yoghurt for eight weeks. Soursop yoghurt is a non-dairy fermented food which deteriotes after long keeping, while African cardamom and turmeric have the ability to enhance nutritional content and preserve the soursop yoghurt.

Keywords: Soursop yoghurt; Aqeous extract; African cardamom; Turmeric

INTRODUCTION

Soursop (*Annona muricata L.*) belongs to Annonaceae family. It is native to humid climate in American countries. Soursop fruits are prone to spoilage, mushy, generally sold in local markets [1]. Soursop fruit is a big heart-shaped safe to eat fruit with different shapes, yellow green in colour having white flesh [2]. Soursop juice is diuretic, have anticancerous, antibacterial, sedative and astringent properties [3]. The skin of immature fruit is dark-green and eventually become yellowish-green when mature. Soursop fruits serve as raw materials for fruit products for example jellies, jam, puree, power fruit bars, flakes, wine, juice and beverages, [1]. The inner surface of soursop is cream-coloured, fibrous and juicy. Soursop fruit is highly rich in carbohydrates for example glucose, lactose and galactose and contains vitamins B1, and B2 in big quantities. [4] noted that calcium, magnesium, zinc, potassium, and phosphorous are in the fruit.

Study has demonstrated that there are various types of raucous fruits and vegetables in abundance in Nigeria [5]. The availableness of fruits is short because it is seasonal and perishable in nature [6]. An example of short lived fruit is (soursop) Annona muricata. This fruit is underutilised and has the ability to prevent diseases. Soursop (*Annona muricata L.*) fruits are important sources of vitamins and minerals and supply flavour, aroma and texture to the delight of consumers and are assume to have anticancer and antioxidant abilities.

Soursop is a delicious and healthy fruit; it is used medicinally to treat illness ranging from stomach ailments to worm infestation .suggested a relationship between soursop consumption and using it to treat Parkinson's disease because of very high concentration of announcing. Also, verified in an in vitro experiment the organic acids extracted from the peel of fruits which is responsible for antileishmanial activity and also demonstrated the activity of the leaf extract against some Leishmania species and Trypanosomia cruzi.

Yoghurt or yoghurt-like products have been used as the most popular vehicle for incorporation of probiotics organisms. Yoghurt is a classic example of a functional food with probiotics. Foods that are refers to as 'functional' are processed food having substances

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that promote explicit bodily functions to being nourishing .Functional foods are developed specifically to encourage health. Functional foods include foods having definite vitamins, minerals and fatty acids. Also, it is biologically active compounds for example plants-chemicals and those which can support beneficial microbial cultures of interest are within this category .Varieties of food for example various yoghurt, types of cheese, creams, baby foods, butter, mayonnaise, powder products or capsules. endorsed the mixture of soy foods into foods for theraupectic treatment.

Yoghurts are the common dairy products consumed in Nigeria, but they are highly susceptible to deterioration during storage. Recently, consumers prefer foods that promote good health and prevent diseases. Such foods constitute current and future waves in the evolution of the food development cycle .Also, food scientists have attempted to develop new technologies that improve the quality and quantity of products, while consumers have also become more critical on the use of synthetic additives to preserve food or enhance characteristics such as colour and flavour .Natural preservatives are generally preferred to synthetic ones which are likely to be hazardous to human health. Literature is sparse on utilisation of African cardamom and turmeric in preservation of soursop yoghurt.

Recently, there is renewed interest among food scientists in the use of natural extracts of spices and herbs as antimicrobials in foods generally. Thus, there is the need to combine the effects of some local spices like African cardamom and turmeric at refrigerated temperature which serve as food preservatives, good sources of phenolic compounds and antioxidants.

Thus, this spice African cardamom (*Aframomum danielli*) possesses preservation attributes highly enrich in vitamins, minerals and subastances that slow or prevent oxidation is far superior than Butylated Hydroxyl Anisole (BHA) and synthetic antioxidants like butylated hydroxyl toluene (BHT) .African cardamom when used in addition to hydrostatic pressure has potent synergistic inhibitory effects on food spoilage yeasts. Preservation characteristics of African cardamom fine particle are linked with phytochemical components known as alkaloids. and stated the tendency and capability of destroying microbes of crude extracts of African cardamom.

Turmeric is a derivative of the plant, Curcuma longa and of ginger family. Turmeric is the most common spice in regions of Mid-East and Asian countries for herbal remedies. Curcumin, a yellow pigment extracted from the root part of the plant species, is a active component of turmeric .It has many biological effects like hypolipidemic antioxidant] and anti-inflammatory activities.

This study was designed to evaluate the potentials of African cardamom and turmeric in soursop yoghurt preservation.

MATERIALS AND METHODS

Soursop fruits, African cardamom pods and turmeric rhizomes were purchased from Oje market in Ibadan, Oyo State, Nigeria.

Soursop juice preparation

Matured and fresh soursop fruits were washed with clean water, hand-peeled and deseeded (removal of the seeds). One hundred (100 g) grammes of the pulp was blended with 1000 ml of distill water using electric blender (Oster, UL-564A, Mexico) several times. The pulp was filtered using muslin cloth to obtain soursop juice .

Preparation of soursop yoghurt

The soursop juice was pasteurised at 90°C for 30minutes, cooled to 43°C. Five (5 g) grammes of yoghurt starter culture with (Streptococcus thermophillus, Lactobacillus bulgaricus and Lactobacillus acidophillus) was mixed with a litre of pasteurised juice, thoroughly mixed and incubated at 43°C for 5 hours, cooled to 4°C to produce soursop yoghurt .

Aqueous extract of *Aframomum danielli*

The removal of *Aframomum danielli* seeds from the pods and sorted by picking, washed and then air-dried for 10hrs at 60°C to reduce the moisture content, milled into powder (Hammer mill of Phillip model H252K) and sieved to obtain fine powder (250 µm) and kept in airtight container. Ten grams of *Aframomum danielli* powder was weighed and added to 100 ml of distilled water and mixed thoroughly. The combination was placed in a refrigerator at 4°C for four days and then centrifuged at 10,000 rpm for 10 mins and the mixtures obtained were used as *Aframomum danielli* extract. The supernatant was later stored at 4°C in a refrigerator until required. Concentrations of *Aframomum danielli* 1.0%, 1.5%, 2.0% and 2.5% were prepared .

Preparation of turmeric extract

The turmeric rhizomes were cleaned in water to eliminate soil lumps, peeled, re-washed. Ten grammes (10 g) of turmeric rhizomes was measured into a 100 ml beaker, milled using electric blender (Oster, UL-564A, Mexico) and soaked for two days in a refrigerator for proper extraction. The milled and soaked turmeric was filtered using muslin cloth to remove the residue, pasteurized at 72°C for 20minutes and allowed to cool, bottled and stored in a refrigerated temperature until ready for use.

Storage studies

Processed yoghurts from soursop juice was preserved with African cardamom and turmeric extracts at various concentrations varying from 0%, 1.0%, 1.5%, 2.0%, and 2.5% and stored at refrigerated temperature (4°C) for three months.

Physico-Chemical analyses

pH of yoghurt samples prepared were determined with a 50ml beaker at 200C using a pH meter (Melter Delta 340) after standardization at pH of 4.0 and 7.0 Total Soluble Solids was measured according to method. Brix was measured with a refractometer (ERMA INC.; Model RHB-10 (ATC) Japan). Total Titratable Acidity was measured using. Protein was carried out using . Vitamin C the method of titration using dye solution modified by was used. Statistical Analysis Data were analysed using ANOVA at P=0.05

RESULTS AND DISCUSSION

Changes in pH of soursop yoghurt sample, Table 1 shows changes in pH of soursop yoghurt treated with African cardamom and turmeric during the twelve week period of storage at refrigerated temperature (40 °C). The pH values of stored yoghurt in respect of the storage conditions decreased as the period of storage increased. pH of soursop yoghurt varied significantly ($p<0.05$) with one another with storage time. pH of soursop yoghurt treated with *Aframomum danielli* ranged between 4.32 and 3.23. There was no significant ($p<0.05$) changes in pH values of soursop yoghurt treated with *Aframomum danielli* at 2.0% and 2.5% with storage at refrigerated temperature (40 °C). The decrease in the pH of samples of probiotics yoghurt could be attributed to the metabolic

activities of the lactic acid bacteria in the yoghurt culture and this is in line with the findings of who stated similar decrease in pH values throughout the storage of commercial yoghurts having Lactobacillus acidophilus and Bifidobacterium bifidum. Analysis showed that the pH of soursop yoghurt was considerably affected by different types, concentrations of the plant materials and the interactions between them (Table 1).

Changes in total soluble sugars (TSS) of soursop yoghurt sample

There were no major changes in total soluble solids of soursop yoghurt samples treated with *Aframomum danielli* at 1.0%, 1.5% and 2.0% concentrations but the treatments were significantly different ($p<0.05$) from one another These activities may be due to the preservative effects of *Aframomum danielli* which had been reported with cashew juice by and in the maintenance of quality cut of apple slices by and all these properties could be credited to maintenance of soluble solids and pH in samples treated with *Aframomum danielli*. There were no major changes in the total soluble sugar content of the yoghurts treated with turmeric at 1.0% and 1.5%, while total soluble solids of the treated samples were significantly($p<0.05$) different from the control sample.

CONCLUSION

The combine effect of aqeous extract of African cardamom and turmeric at concentration of 2.0% and 2.5% improved storage stability of the soursop yoghurt. This study showed that spices like African cardamom and turmeric has the ability to increase nutritional enhancement of food and effectively retained the nutritional qualities of the soursop yoghurt in the preservation of the physico-chemical properties (pH, TSS, TA, Protein, vitamin C).

Table 1: Effects of preservatives and flavourant on (pH) of soursop yoghurt sample during storage.

Storage (weeks)0%	*Aframomum danielli*				Curcumin			
	1.00%	1.50%	2.00%	2.50%	1.00%	1.50%	2.00%	2.50%
0	4.32	4.32	4.32	4.32	4.32	4.32	4.32	4.32
2	3.82	4.41	4.44	4.32	4.09	4.31	4.3	4.31
4	3.45	3.97	3.86	3.86	4.07	3.86	3.86	3.91
6	3.25	3.58	3.58	3.57	3.64	3.61	3.61	3.61
8	2.8	3.3	3.3	3.32	3.57	3.57	3.54	3.54
10	2.51	3.3	3.28	3.32	3.22	3.19	3.18	3.18
12	2.46	3.23	3.26	3.33	3.18	3.17	3.16	3.16

REFERENCES

1. Konsta-Gdoutos MS. Effect of CNT and CNF loading and count on the corrosion resistance, conductivity and mechanical properties of nanomodified OPC mortars." Constr Build Mater. 2017; 48-57.
2. Shang Y, Zhang D, Yang C, Liu Y. Effect of graphene oxide on the rheological properties of cement pastes. Constr Build Mater. 2015; 20-28.
3. Tian X, Hu H. Test and study on electrical property of conductive concrete. Procedia Earth Planet Sci. 2012; 5: 83-87.
4. Yunchuan Z, Liang B, Shengyuan Y, Guting C. Simulation analysis of mass concrete temperature field. Procedia Earth Planet Sci. 2012; 5: 5-12.
5. Lu Z. Early-age interaction mechanism between the graphene oxide and cement hydrates. Constr Build Mater. 2017; 152: 232-239.
6. Makar JM, Chan GW. Growth of cement hydration products on single-walled carbon nanotubes. J Am Ceram Soc. 2009; 92: 1303-1310.