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Full Length Research Paper

Effects of Blanching on the Qualities of Negro Pepper

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Negro pepper is a spice with high nutritional values and several beneficial phytochemical compounds. The processing and storage of this spice has been known to have various effects on its qualities and so this study is on the effects of blanching on the qualities (nutritional, phytochemical and microbial) of the seeds. The seeds were steeped in 1500ml of water for 24hours. The steeped seeds were then placed on a tray and drained in a 78 ± 2ºC steam cooker and was blanched under atmospheric pressure for 10, 20, 30 and 40 minutes. It was dried in the oven maintained at 45± 2ºC for 24hours and then milled. The prepared samples of the seeds were subjected to Nutritional evaluation, phytochemical and microbial analysis using standard methods. There are general increase in the samples nutrients with blanching time except the ash content that reduced from 2.33% to 2.12%. The same increment trend was obtained for the mineral content. There were reductions in the phytochemical compounds of the spice with blanching time: oxalate (0.64-0.21)gm/100g; tannin (0.74-0.18)gm/100g; saponin (0.75-0.17)gm/100g; phytate (0.20- 0.08)gm/100g and flavonoids (0.49-0.39)gm/100g. Blanching also reduces the microbial load with the total plate count (2.90 $\times 10^4$ -1.49 $\times 10^4$ and total fungi (0.01 $\times 10^5$ to 6.0 $\times 10^2$). Conclusively, blanching in the vicinity of 10- 15 minutes can be adopted for use in handling the spice since the best nutrients retention and maximum phytochemical loss and reduction in the microbial load were observed in this vicinity.

Keywords: Blanching, Nutritional, Microbial, Phytochemical, Spices

INTRODUCTION

Spices are dried seeds, fruits, roots, barks or vegetative substances used in nutritionally insignificant quantities as food additives or adjuncts that impart flavor, color or preservative effects on food products (Srinivasan, 2005). Spices are implicated in various applications; these include medicinal, religious, rituals, cosmetics, perfumery, condiments, additives and preservatives. They have antioxidative, antimicrobial and soothing properties (Purseglove *et al.,* 1991). The nutritional and health benefits of spices are beginning to be well known that many spices are popping up in the vitamin aisles in larger stores and can be found in capsule form. Included in these spices is Negro Pepper *(Xylopia aethiopica*). It is an angiosperm belonging to the family *Annonaceae.* It is an evergreen aromatic tree native to the low land rain forest in tropical Africa (Kaefer and Milner, 2008). The fruit is a small twisted bean-pod.readily available, ecologically friendly and economical. Its adoption by resource-poor farmers in the tropics is easy (Iwu *et al.*, 1999). Tairu *et al.,* 1999) have documented the medicinal uses of Negro pepper as a cough remedy, a post partum tonic and a lactation aid. Other uses are for treatment of stomachache, bronchitis and dysentery. The dried fruits are also used as spices in the preparation of two special local soups named “obe ata” and “isi-ewu” taken widely in the Southwest and Southeastern parts of Nigeria

Negro Pepper seeds
↓
Sorting
↓
Washing
↓
Steeping (in 1500ml water for 24hrs)
↓
Blanching (for 10, 20, 30 and 40mins)
↓
Drying (45 ± 2ºC for 24hrs)
↓
Milling

Figure 1: Flowchart for Blanching of Negro Pepper seeds

respectively (Abolaji *et al.,* 2007). Spices are composed of fiber, carbohydrate, fat, protein, ash, volatiles (essential oils) and other non-volatile components. In the course of exploiting the usefulness of this seed, they are usually subjected to various processing and unit operations which do affect these qualities. Cooking or roasting alters the nature of many spice constituents like starches, proteins and volatiles by changing their physical, chemical and nutritional characteristics. Milling and storage can also allow flavor oxidation and losses (Belitz and Grosch, 1987). As a result, it becomes necessary to study the effects of blanching on the qualities of Negro Pepper so as establish the optimum blanching temperature- time combination to be adopted for its handling.

MATERIALS

The negro pepper (*Xylopia aethiopica*) obtained from a local farmer in Jagun market, Ogbomoso and subjected to uniform moisture treatment. The equipment and other materials used were of food grade and analytical standard. They are procured from the Department of Food Science and Engineering Ladoke Akintola University of Technology, Ogbomoso and Institute of Agricultural Research and Training, OAU Moor Plantation Ibadan, Nigeria.

METHODS

100g of Negro pepper seeds were steeped in 1500ml of water for 24hours. The steeped seeds were drained and placed on a tray in a 78 ± 2ºC steam cooker and it was blanched under atmospheric pressure for 10, 20, 30 and 40 minutes. It was dried in the oven at 45± 2ºC for 24hours and milled (Figure 1) (Abiodun and Adepeju, 2011).

Analyses

Nutritional Analyses

The analyses carried out were done according to the methods in AOAC (2005). Ash Content by the use of muffle furnace, Crude Fat by solvent extraction (Petroleum ether) and the Crude Fibre using the standard digestion method. The Total Nitrogen was determined by Kjehdal method and the value multiplied by 6.25 to obtain the actual protein value. The minerals analysis were cried out using AOAC (2005) procedure of Atomic Absorption Spectrophotometer (AAS) Major minerals elements like calcium magnesium, iron, and potassium were determined. The phytochemical compounds determined include: phytic acid, saponnins, tannins, oxalate, and flavonoids. These were determined using the methods in AOAC (2005)

Microbiological Analysis

About 1ml of diluted sample mixture was aseptically poured into each sterilized plate containing agar using a sterilized pipette. Potato dextrose agar, yeast count agar, was used for total plate count and (mould and yeast) count respectively. The plates were incubated at room temperature for 48 hours. Aseptic condition was ensured and colonies were counted using a stile art scientific colony counter with model number LGAEB, PPC 29. The counts were done in duplicates for each sample (Frazier, 2000)

RESULTS AND DISCUSSION

Effects of Blanching on the Nutritional Composition of Negro Pepper Seed

Effects of blanching on the nutritional composition of

Table 1. Effects of Blanching Time (min) on the nutritional Composition of Negro Pepper Seed

Proximate Composition (%)		Blanching	time (mins)		
	A	**B**	**C**	**D**	**E**
Ash	2.33±0.03c	2.60±0.01e	2.46±0.04d	2.21±0.03b	2.12±0.01a
Protein	10.1±0.01a	10.26±0.02b	15.14±0.04e	14.06±0.02d	13.94±0.02c
Fat	11.08±0.02a	11.2±0.03b	12.37±0.02c	14.02±0.01d	15.27±0.03e
Fibre	31.36±0.04a	32.27±0.02c	33.38±0.02d	35.57±0.02b	38.80±0.03e
		Blanching	**time (mins)**		
Minerals (mg/100g)	**A**	**B**	**C**	**D**	**E**
Mg	2.75±0.01a	2.73±0.04a	2.69±0.03a	2.65±0.04a	2.63±0.02a
Ca	3.56±0.04a	3.54±0.04a	3.35±0.04a	3.24±0.02a	3.16±0.04a
Fe	64.35±0.04a	62.23±0.02a	62.14±0.04a	60.35±0.04a	60.04±0.04a
K	9.18±0.03a	8.90±0.02a	8.73±0.03a	8.64±0.03a	8.44±0.03a

Table 2. Effect of Blanching Time (min) on some Phytochemical Compounds and Microbial Load of Negro Pepper Seed.

Phytochemical compounds (mg/100g)		Blanching time	(min)		
	A	**B**	**C**	**D**	**E**
Oxalate	0.64±0.00e	0.45±0.00d	0.41±0.00c	0.32±0.00b	0.21±0.00a
Tannin	0.74±0.03e	0.64±0.03d	0.42±0.02c	0.26±0.03b	0.18±0.02a
Saponin	0.75±0.00e	0.37±0.00d	0.34±0.00c	0.25±0.00b	0.17±0.00a
Phytate	0.20±0.00e	0.13±0.00d	0.12±0.00c	0.09±0.00b	0.08±0.00a
Flavonoids	0.19±0.03a	0.80±0.00e	0.65±0.00d	0.43±0.00c	0.39±0.00b
Microbial load		**Blanching time**	**(Mins)**	**(10^{4})**	
	A	B	C	D	E
TVB (cfu/ml)	2.92	2.56	2.30	2.20	1.49
Total Fungi	0.10	1.50	0.10	0.10	0.06

KEY:
A= Control, B= 10mins blanching time, C=20mins blanching time, D=30mins blanching time, E=40mins blanching time and TVB= Total Viable count in STD×10^{4}.
Values are means of three determinations
Values with same letters within the same row are not significantly different (P=0.05

negro pepper seed are presented in Table 1. There were significant variations in the protein content of all blanched samples and the unblanched sample. However, the sample that was blanched for 20 minutes had the highest protein content of 15.14% while there was a decrease in the protein content after 30 minutes of blanching to 14.06%. A further decrease was observed after 40 minutes of blanching. The result showed that blanching enhanced protein retention however a longer period of blanching could result in its reduction. This could be attributed to leaching of soluble components of the protein into the blanching water since the broth was discarded, some protein would have been lost (Adeparusi, 2001). Significant increase was observed in the fat content of the blanched samples: Sample A (11.08%), B(11.20%), C (12.37%), D (14.20%), and E (15.27%). The increment in the fat content of the blanched sample can be attributed to the removal of vapour, during blanching, vapour leaves void for fat to enter later, this is the reason why fat uptake is largely determined by the moisture content of the product (Mehta and Swinburn, 2001).

There were increment in the ash content 2.33% in Sample A (control)) to 2.60% (sample B), followed by a decrease from 2.21% (sample E). This result showed that blanching could enhance mineral retention. However, a longer blanching time could lead to gradual leaching of the mineral content of the sample. Nkafamiya *et al* (2010), recorded reduction in the ash content of some leafy vegetables during blanching. A significant increase was found in the fibre content with blanching time. Sample A (31.30%), B (32.27%), C (33.38%), D (35.07%) and E (35.38%). Increase in the fibre content after blanching is advantageous since fibre performs important role of promoting soft stool as it is characteristic of fibre rich diets (Okaka *et al*., 2000). All the minerals experience decrease in the values with blanching but with a significant difference in the various blanching temperatures: Magnesium (2.75ppm to 2.63ppm); Calcium (3.56ppm to 3.16ppm); Iron (64.35ppm to 60.04ppm) and Potassium (9.18ppm to 8.44ppm). The implication of this is that blanching did not improve the minerals content of Negro pepper but rather reduced them insignificantly. This may be due to leaching that occurs during blanching (Abiodun and Adepeju, 2011).

Effect of Blanching on the Phytochemical Compounds and the Microbial Load of Negro Pepper Seed

Data on the effects of blanching time (0-40mins) on the phytochemical compounds of negro pepper seeds are as presented in Table 2. Oxalate content in all the samples reduced progressively with blanching time, from Sample A (0.64mg/100g) through sample B (0.45mg/100g), C (0.41mg/100g), D (0.32mg/100g) to E (0.21mg/100g). This is in agreement with the work of Nwosu, (2011), who recorded a reduction of the oxalate value from 2.80mg/100g, to 0.20mg/100g with blanching time of oze seeds. Direct contact of the seeds with hot water might allow for leaching of oxalate from the seeds. The tannin content equally reduced with blanching time. Sample A (control) had 0.74mg/100g which reduced through sample B, C, D, to E at 0.64mg/100g There is a a significant difference at each level of blanching. Saponin content reduces from 0.17mg/100g to 0.75mg/100g with blanching. This showed that blanching can also reduce saponin significantly. This is similar to the findings of of (Nwosu, 2011) who recorded reduction of saponin in oze seed from 840mg/100g to 20mg/100g after blanching for 8 minutes The phytate level reduced from 0.20mg/100g through 0.13mg/100g (sample B) to 0.08mg/100g in sample E. Heat treatment such as cooking, blanching, roasting had been reported to reduce phytate level in several plant foodstuffs (Badifu, 2011). For the microbial load, there was a decrease in the total viable bacteria count as blanching increased. The population of fungi also decreased progressively with blanching time. This is due to the fact that application of heat did not favour the growth of both bacteria and fungi. This is in line with the work of of Kolawole and Omafuvbe (2005) who reported a reduction in the microbial load of processed alligator pepper and Negro pepper.

CONCLUSION

The results obtained in this study indicated significant improvement in the nutritional status of the macronutrients while that of the micronutrients were insignificant. Significant reductions in the phytochemical and microbial load of the seed in the vicinity of 10-15 minutes blanching time were observed. Therefore, it can be recommended that blanching should be made for between 10 to 15 minutes for maximum nutrient retention and bioavailability, reduction in the phytochemical compounds and the microbial load.

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