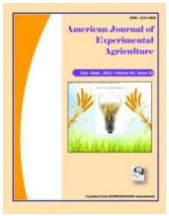

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Storability of Sliced Dehydrated Tomato

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Authors' contributions

This work was carried out in collaboration between all authors. Author SBF designed the study, author KOZ wrote the protocol and wrote the first draft of the manuscript. Author FFI reviewed the experimental design and all drafts of the manuscript. Authors KAA, OAOA and IOI managed the analyses of the study. Authors TMA and AOA prepare the sample. Author FFI performed the statistical analysis. All authors read and approved the final manuscript.

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ABSTRACT

Three different varieties of tomatoes, Alawusa (TX1), a local variety with four lobes (TX2) and another local variety with two lobes (TX3) were sliced and dried in an oven at 55ºC for a period of four hours. The dried samples were packaged in polythene bags labeled TX1, TX2 and TX3. Proximate composition, titratable acidity and pH were monitored initially and fortnightly. The results revealed that there were no significant differences among treatments (P = 0.05) in all the parameters determined during the course of storage. The following ranges were observed among treatments in the proximate composition within the storage period: crude protein, 9.65- 16.85%; crude fiber, 14.43- 19.63%; ether extract, 0.11-3.33%; ash, 7.45-10.47% and nitrogen free extract (NFE), 58.58-65.23. Protein values were found to be decreasing during the course of storage in all treatments, whereas no definite trends were observed for pH and titratable acidity.

Keywords: Tomatoes; proximate composition; polythene bags; storage.

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1. INTRODUCTION

The importance of good pre-harvest, harvest and post-harvest practices cannot be overemphasized in minimizing postharvest losses of agricultural crops. Postharvest losses of fruits and vegetables are extremely high in Nigeria (30-50%), exacerbated by poor marketing, distribution and storage facilities [1]. Tomato (*Lycopersicon esculentum*) is an important vegetable grown in Nigeria. It is also one of the most commonly grown vegetable in the home garden. It is a rich source of natural vitamins and minerals which prevent scurvy and boost immune system and enhancing rapid healing [2]. Fresh tomatoes contain up to 95% water and this is sufficiently moist to support both enzymic activity and growth of microorganisms [3]. It is a very versatile vegetable for culinary purposes; unfortunately it is seasonal, highly perishable and deteriorates very few days after harvest, losing almost all their required quality attributes and some likely result to total waste. It has been found that as high as 50% of these produce are lost between rural production and town consumption in the tropical area [4].

In view of postharvest losses of tomatoes in Nigeria, this study was carried out as an attempt to reduce postharvest losses thereby improving the shelf-life of the produce, and also to assess changes in nutritional qualities of dehydrated stored tomato.

2. MATERIALS AND METHODS

Fresh tomatoes: Alawusa (TX1), a local variety with four lobes (TX2), and another local variety with two lobes (TX3), were obtained from a local market, Bodija, in Ibadan, Nigeria.

2.1 Preparation of Sliced Dehydrated Tomato

Tomatoes (500 g) of each variety were washed in clean water. Each variety was separately sliced and dried in the oven at 55ºC for 4 hours. They were packaged separately in polythene bags. pH, titratable acidity (TTA) and proximate composition were monitored fortnightly for seven weeks.

2.2 Chemical Analysis

pH, titratable acidity, (TTA) were determined in triplicate according to standard methods as described by [5]. pH of the samples was determined using pH meter (Metrohm 620) calibrated with buffers 4 and 7. Titratable acidity of the samples was determined by titrating 5g of the samples with 0.1N Sodium hydroxide (NaOH) using phenolphthalein as indicator. Proximate analysis was determined on dry matter basis using the methods of [6].

2.3 Statistical Analysis

Mean of triplicate values were computed and data were subjected to analysis of variance (ANOVA) using SPSS version 15.

3. RESULTS AND DISCUSSION

Table 1 shows the results of changes in pH, TTA and proximate composition of dehydrated tomatoes with storage period. Results of the study show that pH of the tomatoes TX1 (Alawusa) ranged from 4.41-4.57, TX2 from 4.40-4.58 and TX3 from 4.36-4.60. These observations show that there were increases in the pH in all the three varieties during storage. The titratable acidity of the samples of the three varieties varied between 0.063 and 0.375% which was not significantly different ($P>0.05$) with the storage period. The proximate composition of the varieties of dehydrated tomatoes with the storage period is shown in Table 1. The crude protein values generally decreased in all varieties during the course of storage with the following ranges: TX1, 13.83- 9.65; TX2, 13.03-10.01 and TX3, 16.85-11.97. These results further confirm the previous work by [7] who worked on household processing and dissemination of tomato paste technology.

Although no definite patterns were observed in the crude fiber composition in all the three treatments, however, it was observed that relatively higher values were recorded for initial and 7^{th} week storage for TX3 as 19.63% and 18.49% respectively. It was generally observed that values obtained for ether extract were lower than 1.00% for the three varieties during the course of storage, however some values recorded for TX2 and TX3 were above 2.00%. This observation could be due to varietal differences which reflected in the oil composition as observed in the three treatments. The ash content of the three varieties varied as follows during the course of storage: TX1, 9.25-7.23%; TX2, 10.47-9.01% and TX3, 10.04-7.45%.

Table 1. Chemical composition of dehydrated tomato from different varieties of tomatoes during storage

Storage week	Samples	pH	TTA (%)	Crude protein (%)	Crude fiber (%)	Ether extract (%)	Ash (%)	NFE (%)
1st week	TX1	4.52	0.063	13.83	17.31	0.11	8.25	60.50
	TX2	4.52	0.077	13.03	18.54	0.18	10.47	57.78
	TX3	4.53	0.112	16.85	19.63	0.57	8.52	55.50
3rd week	TX1	4.41	0.375	9.79	16.79	0.29	9.25	63.88
	TX2	4.40	0.291	10.21	14.58	3.33	9.49	62.39
	TX3	4.36	0.340	12.70	16.84	1.44	10.04	58.98
5th week	TX1	4.54	0.263	9.70	15.83	0.98	8.99	63.80
	TX2	4.40	0.235	10.12	14.91	2.83	9.01	63.13
	TX3	4.41	0.494	12.10	14.87	2.46	8.91	61.66
7th week	TX1	4.57	0.137	9.65	17.96	0.81	7.23	64.35
	TX2	4.88	0.154	10.01	14.43	0.91	9.42	65.23
	TX3	4.60	0.140	11.97	18.49	2.44	7.45	58.58

The values of protein, fibre, ash obtained are higher than those obtained in the hydrated forms of tomatoes varieties as reported by [8,9,10] the higher levels of nutritional component in the dehydrated samples are due to the level of concentration, which may further imply that consuming dehydrated tomato gives one higher access to more nutrients. It was generally observed that the final values at the end of 7th week storage in all the three treatments were lower than their corresponding initial values. Decrease in ash content could be due to changes in dry matter content with storage period. Nitrogen free extract (NFE) varied during the course of storage with the highest value of 65.23% recorded for TX2 at the end of 7th week storage, whereas the least value of 55.50% was observed for TX3 for the initial sample. This non-significant variation (P>0.05) could be due to total soluble carbohydrates composition of the three varieties of tomatoes used for this study. The red color of the tomato was still maintained at the end of storage.

4. CONCLUSION

This study revealed that sliced dehydrated tomatoes can be stored for seven weeks, thereby reducing its postharvest losses, ensuring food security and poverty reduction in Nigeria.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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