

Preservation of Tomatoes

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Abstract. This is a study that had the objective of preserving fresh tomatoes for two weeks using hot water treatment (88°C). There was a positive control which was freshly bought tomatoes and negative control which was fresh tomatoes kept in storage for two weeks without receiving any treatment. After the observation period, the samples were stewed and fed to fourteen taste panelists who judged them using the hedonic scale ratings from 9-1. The results from the ratings showed that negative control tomatoes scored 118 points while hot water treated tomatoes scored 119 points, the highest score of 122 points was scored by positive control. These scores from the rating indicated that the judges did not detect any difference in taste between the preserved tomatoes and the controls. Thus this study revealed that well preserved tomatoes can replace fresh tomatoes in stews, a trend that is yet to gain ground in this part of the globe.

Keywords: Tomatoes, hot water, hedonic scale, stewing, anaerobic bottles.

1. Introduction

Supremely ripe and juicy tomatoes can be preserved by canning, freezing and or drying. Some of these methods are time consuming but none require special skills or anything complicated [1].

In the past, before refrigerators, drying was the only way to store perishable foods. Also when travelling in areas without food supplies (on land or certainly at sea), it was the only way to have meat, fish or some vegetables. The final reason is to be able to have foods that are out of season. For instance, berries usually grow in the summer making preserves allows people to have them all year round.

In this day of refrigeration, easy access to supermarkets and trucking that brings any kind of food to any location. The main reason of preserving is really more of a luxury, simple shelf life in the fridge, foods can be used longer before they are thrown away [2].

Tomatoes are important part of Nigeria diet that it is hard to believe that they were once considered toxic. It was not until 1800s that they become a staple food in the US. The glossy red fruits (which actually come in all kinds of colours including yellow and deep purple) are packed full of vitamins (A, C and E) one medium whole tomatoes contain around 22 calories, 0g of fat, 5g of carbohydrates, 1g of dietary fibre, 1g of protein and 6mg of Sodium. They are low in kilocalories with around 14 kilocalories per 100g, approximately one and a half classic tomatoes or five to six tomatoes [3].

Tomatoes are not only a good source of Vitamin A and C but they are also a good source of other vitamins and minerals. Tomatoes contain higher levels of minerals, Phosphorus and Potassium, they also contain folate and high levels of the antioxidants beta-carotene and lycopene. One medium tomato have 552mcg of beta carotene and 3,165mcg of lycopene which can help boost the immune system by fighting the damaging effects of substances called free radicals [4].

Tomatoes contain important nutrients such as niacin, folate and vitamin B₆ that are associated with the reduction of heart disease. One study showed that women who eat 7 to 10 servings of tomatoes products per

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week had a 29% lower risk of cardio-vascular disease than women who consumed less than a serving and a half of tomatoes products each week [3].

Spoilage of tomatoes are those adverse changes in quality of tomatoes, which are brought about by the action of predominantly biological factors and physical factors. These changes may include, change in taste, smell and appearance or texture of the tomatoes fruits [5]. Tomatoes are said to be spoiled, when its characteristics are changed so that it is no longer good for consumption such change may not always be microbiological in origin. A general features of microbial spoilage is its related sudden onset, it does not appear to develop gradually, day by day a little worse but more often as an unexpected and unpleasant revelation [6].

1.1. Statement of Problem

Tomatoes are a highly perishable food crop so it is usually consumed immediately after harvest. In the event that consumption does not take place after harvest there is a need to preserve so that spoilage does not occur.

1.2. Objective of Study

This study seeks to:

Preserve tomatoes using heat treatment.

Evaluate consumer preference of the preserved tomatoes.

2. Materials and Methods

The material used to carry out this study includes:

Anaerobic bottles, bowls, buckets, garlic, ginger, ground nut oil, knife, pots, seasonings. Stove, Tomatoes, water, hedonic scale.

2.1. Methods

2.1.1. Sample collection

The raw materials used for this study was bought from the markets in Benin City. They were collected in sterile containers and taken to the laboratory for preservation.

2.1.2. Preservation technique

The fresh ripe tomatoes was divided into four parts and each part tagged A and B, at the end of the preservation period, another batch of tomatoes tagged C was brought in for study. All the tagged tomatoes were stewed and fed to fourteen panelists who graded the products using the hedonic scale. The panelists' response was subjected to t-Test analysis.

2.1.3. Group A – Hot water treatment

The tomatoes were sorted and cleaned. They were blanched in hot spiced water (88°C) (garlic and ginger) for ten minutes, the water was drain off and the tomatoes was loaded in an air tight bottle and allowed to stand in hot water (100°C)for five minutes before closing it. It was labeled and kept in storage for two weeks.

2.1.4. Group B – negative control

These tomatoes did not receive any treatment. They were sorted and cleaned. They were put in air tight bottle and labeled. They were left in storage for two weeks.

2.1.5. Group C – positive control

These were freshly bought tomatoes that did not receive any treatment and were not in storage. They were blended and stewed immediately.

2.1.6. Stewing of the tomatoes

Tomatoes tagged A, B, and C for this study was stewed using the conventional stewing method and fed to fourteen taste panelist for sensory evaluation. The hedonic scale was used to assess the level of preference of the various products. The ratings on the scale are from 9-1.

2.2. Results

Samples A,B,C, were fed to fourteen panelists. Table 1-Table 3 shows ratings for stewed hot water treated tomatoes, negative and positive controls tomatoes. Table 1 reveals that more panelists rated product

A 9 points. Table 2 shows the panelists ratings of the negative control were half of the panelists rated it 8 points. Table 3 is the representation of the ratings of the positive control where ten panelists rated it 9 points. Table 4 is an array of the ratings by the panelists showing the total score for each products which reveals that product C had 122 points, followed by product A which had 119 points and then products B had 118 points. During storage, samples A and B were able to maintain the integrity of their texture, they were firm throughout storage. Sample B which was the negative control did not receive any treatment so there was fungi growth noticed on the surface of the tomatoes which was washed off with brine before it was stewed.

Table 1: Panelists ratings Product (A)

| judges | product A |
|--------|-----------|
| 1 | 8 |
| 2 | 9 |
| 3 | 9 |
| 4 | 8 |
| 5 | 9 |
| 6 | 9 |
| 7 | 9 |
| 8 | 7 |
| 9 | 9 |
| 10 | 9 |
| 11 | 9 |
| 12 | 8 |
| 13 | 8 |
| 14 | 8 |
| total | 119 |

Table 2: Panelists ratings for Product (B)

| judges | product B |
|--------|-----------|
| 1 | 9 |
| 2 | 8 |
| 3 | 8 |
| 4 | 8 |
| 5 | 8 |
| 6 | 9 |
| 7 | 8 |
| 8 | 8 |
| 9 | 8 |
| 10 | 9 |
| 11 | 9 |
| 12 | 9 |
| 13 | 8 |
| 14 | 9 |
| total | 118 |

Table 3: Panelists ratings for Product (C)

| judges | product C |
|--------|-----------|
| 1 | 9 |
| 2 | 8 |
| 3 | 9 |
| 4 | 8 |
| 5 | 9 |
| 6 | 9 |
| 7 | 9 |
| 8 | 9 |
| 9 | 9 |
| 10 | 8 |
| 11 | 9 |
| 12 | 9 |
| 13 | 8 |
| 14 | 9 |
| total | 122 |

Table 4: An array of the ratings for Samples A,B,C

| judges | product A | product B | product C |
|--------|-----------|-----------|-----------|
| 1 | 8 | 9 | 9 |
| 2 | 9 | 8 | 8 |
| 3 | 9 | 8 | 9 |
| 4 | 8 | 8 | 8 |
| 5 | 9 | 8 | 9 |
| 6 | 9 | 9 | 9 |

| | | | |
|-------|-----|-----|-----|
| 7 | 9 | 8 | 9 |
| 8 | 7 | 8 | 9 |
| 9 | 9 | 8 | 9 |
| 10 | 9 | 9 | 8 |
| 11 | 9 | 9 | 9 |
| 12 | 8 | 9 | 9 |
| 13 | 8 | 8 | 8 |
| 14 | 8 | 9 | 9 |
| total | 119 | 118 | 122 |

2.3. Discussion

Tomatoes are highly perishable and subject to surface and internal damage. They are sensitive to chilling injury. There should be proper temperature management during storage. Tomatoes flavor should be preserved as much as possible so any means employed to preserve tomatoes should be able to maintain its flavour. In this study three methods used to preserve tomatoes proved to be very successful this is because the tomatoes did not rot for the two weeks that it was under observation. The air tight container was able to keep the tomatoes intact. Close view revealed that the raw tomatoes did not lose its fresh flavor and texture including the negative control. The treatments that the tomatoes received preserved them [7]. There are reports on canning methods of tomatoes and the consumer's response to canned tomatoes [6]. The study revealed that all panelists enjoyed the stewed products and were not able to differentiate stews made with fresh tomatoes from stews made with preserved tomatoes. This is evident in the panelists rating of the various products served. The method of preservation was able to keep the tomatoes in fresh condition without causing unusual souring or sliminess of the stewed products. Stews made from spoiled tomatoes are usually slimy and unpleasant to the tongue but these products were quite pleasant to the tongue. When the tomatoes were removed from storage samples still had firm texture. Samples A exude freshness when the bottle was opened. This technique has been able to inhibit the spoilage organisms of tomatoes during storage. Dipping tomatoes was dipped in hot water having 50°C temperature, caused ripening to be delayed, chill injury was reduced and post-harvest diseases that is initiated by microorganisms was controlled [8]. Hot water- dip treatment extended the quality of whole tomatoes in storage [9].

2.4. Conclusion and Recommendation

This study has revealed that fresh tomatoes preserved by sun drying, hot water treatment and by paste bottling do not lose their tastes when stewed. This is deduced from panelists rating which did not show much difference in preference which indicate that there was no difference in taste. They could not differentiate whether the tomatoes were preserved or fresh. Food vendors who use tomatoes to prepare food can use any of these methods to preserve tomatoes so as to save money during the period of scarcity where the cost of tomatoes rises sharply thus increasing production cost and depleting the profits.

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