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# Effects of Different Drying Methods on the Nutritional Status of *Lycopersicon Esculentum* (Tomato) Mill.

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***Abstract:*** *Fully ripened Lycopersicon esculentum (tomato fruits) fruits sliced and dried at various temperatures: sun-dried covered with white cloth, sun-dried uncovered, dried at room temperature (37$^{o}$C), and dried at 50$^{o}$C in an oven were used in this study. The effects of the various drying conditions on the nutritional status of the tomato fruit was assessed showing that different drying condition have different effect on the various nutrient components of the fruit. It was observed that nutrient components such as ascorbic acid, protein, and moisture content of the sample were to some extent related to rate of exposure and the drying method. Carbohydrate content was significantly higher in the oven dried sample compared to the remaining drying conditions. The effects of the various drying conditions on crude fat content were to some extent the same all through.*

***Key words:*** *Lycopersicon esculentum, nutritional status, drying conditions, ascorbic acid, and moisture content.*

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## I. Introduction

The tomato plant *Lycopersicon esculentum* is a seasonal, climbing plant of the family solanaceae. The stem covered with shiny hairs usually prostrate, only the tips being erect. The leaves are large and deeply cleft, with many leaflets; they are arranged alternately along the stems. Both the leaves and the stems have strong smelling. Clusters of four to six flowers, sometimes more, form on the stem between the leaves (Philip, 1989).

Tomato fruits exist in many shapes, some of which are seen in large and round or elongated, depending on the variety. However, varieties of cherry tomato have small fruit not more than two centimetres in diameter. These became naturalised in Africa a long time ago, whereas the commercial varieties that are popular in urban areas are grown from seed first then imported in the recent past (Michael, 1985).

In Nigeria today, tomatoes are produced in Northern States such as in Plateau, Kano, Sokoto, Bauchi, Gombe, and Borno States due to the activities of the River Basins Development Authorities and also requires warm temperature which favour foliage production but hot dry condition results in the dropping of flower and foliage. The tomato plant also required a high light intensity, for the influences of Ascorbic content, which means low light intensity brings about low ascorbic acid content in tomato fruit. Tomato fruit adds pleasant taste to diet, provide flavour and aroma in served food, used in the production of ketchup, used in juice production, and also serves as food (eaten raw) (Oyenuga, 1968).

## II. Materials And Methods

The tomato fruits used for this study were locally obtained from Jimeta main market. Highest quality of ripened tomato fruits free from mould with correct size and colour were selected. The selected tomato fruits were thoroughly washed in clean chlorinated water and rinsed in sterile distilled water. The tomato fruits were sliced into two equal parts before being subjected to the various drying conditions. These conditions include drying at room temperature, drying under the sun, drying under the sun covered with clean white cloth, and drying in an oven at 50$^{o}$C. After drying the tomato fruits under the aforementioned conditions, slices of dried tomato fruits were subjected to proximate analyses.

Moisture content, total ash, crude fat, and crude protein determinations were carried out according to the methods described by the Association of Official Analytical Chemists (AOAC)) 1980. Vitamin C was determined by the titrimetric method described by Sen and Donaldson 1978. Carbohydrate content was determined by difference. That is the sum total of the values of the moisture, ash, and protein and fat subtracted from a hundred.

## III. Results And Discussion

Ripened sliced tomatoes dried under the different drying conditions were analysed for moisture content, ash, crude fat, crude protein, vitamin c, and total carbohydrate as depicted in the table below:

**Table 1: Proximate composition of tomatoes dried at different temperatures (g/100g dry weight).**

| Sample | A | B | C | D |
|---|---|---|---|---|
| Drying treatment | Covered sun dried (5-6days) | Dried at room temperature (9-10 days) | Oven dried at 50$^{o}$C 8hrs | Sun dried 4 days |
| Moisture content | 4.60±0.07 | 5.20±0.21 | 3.40±0.05 | 4.40±0.15 |
| Ash content | 4.00±0.06 | 4.05±0.02 | 3.50±0.21 | 4.01±0.04 |
| Crude fat | 3.40±0.21 | 3.60±0.10 | 3.20±0.20 | 3.20±0.20 |
| Crude protein | 10.64±0.01 | 10.93±0.02 | 9.07±0.03 | 10.04±0.02 |
| Total carbohydrate | 72.68±0.03 | 72.94±0.23 | 74.43±0.15 | 72.02±0.25 |
| Vitamin C | 4.68±0.28 | 3.28±0.21 | 6.40±0.01 | 6.33±0.04 |

Key: values are means ± standard deviation for three determinations
Vitamin C = mg//100g dry weight

Result of the analysis of tomato fruits subjected to various drying conditions revealed that the percentage composition of the nutrient components was to some extent dependent on the conditions (temperature) to which the samples were subjected to. For instance, the oven dried sample has the lowest crude protein content (9.07±0.03), followed by sun dried sample (10.04±0.02), the covered sun dried sample (10.64±0.01), and sample dried at room temperature (10.93±0.02). The low protein content of the oven dried samples may be due to sensitivity of protein to high temperatures, which may lead to denaturation of the protein. This condition was observed by (Alfred, 1995) who reported that proteins subjected to high temperatures may be denatured and toughening of the protein may reduce digestibility.

It was also observed that there was higher sugar content in all the samples as compared to other nutrient components. However, the oven dried sample seemed to have a little higher sugar content (74.45%) than other samples. Similar observation was reported by Peter *et al.,* 1992 that at high temperature the concentration of sugar is high, which contribute to the taste.

The result also showed that there was little or no significant difference in the level of fat in the various samples dried at different conditions. It could be assumed that the effect of the various temperatures on the various samples was equal to a certain degree. The same case was observed by Patel *et al*., 2018 who reported that at high temperature, fat molecules decompose into their component glycerol and fatty acid, which affects the nutritive value of fat.

Moisture content of the samples were 4.6% in sun dried with white cloth, 5.3% in the sample dried in an oven at 50$^{o}$C and 4.4% moisture content obtained in the sun dried sample. However, there was no microbial growth observed. Similarly, Kordylas in 1991 reported that 2-6% moisture content is unfavourable for the growth of microorganisms and makes it good for storage.

This study showed that the oven dried (6.40±0.01) and sun dried (6.33±0.04) samples has higher vitamin C content than covered sun dried sample and the sample dried at room temperature which was 6.33% and 4.68% respectively. These differences in the amount of Vitamin C observed under these drying conditions may not be farfetched from the duration of exposure to the drying conditions. That is the longer it takes the fruit to dry the less the amount of Vitamin C observed. The low vitamin C content of both samples dried at room temperature and covered sun dried could probably be due to oxidation as a result of a longer drying period. Similar observation was reported by Patel *et al*., 2018 that oxidation decreases ascorbic acid content.

## IV. Conclusion

The result of this research showed that drying at slightly high temperature may decrease some nutrient components of tomato fruits such as protein, while vitamins such as ascorbic acid are retained. Fat and carbohydrate constituents of tomato fruit subjected to various drying conditions were not affected. Therefore, preservation of tomatoes during its season should be done by drying in the sun and in the oven at slightly high temperature over a short period of time in order to avoid oxidation through prolonged drying.

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