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ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 18 No. 1
April 2018
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Afr. J. Food Agric. Nutr. Dev. 2018; 18(1): 13095-13109 DOI: 10.18697/ajfand.81.16975

BIOCHEMICAL PROPERTIES OF SIX VARIETIES OF TOMATO FROM BRONG AHAFO REGION OF GHANA AS INFLUENCED BY THE RIPENING CONDITION AND DRYING

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AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 18 No. 1
April 2018
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

ABSTRACT

The study was conducted to assess the influence of the ripening condition and drying on the biochemical properties of six varieties of tomatoes (*Lycopersicum esculentum*). The six varieties (Tatiana, Techiman, Tropimech, Pectofade, Rodade and Pawa) were obtained from different tomato growing centres of the Brong Ahafo region of Ghana. Fresh fruits were harvested at mature green, half ripe and full ripe conditions using the USDA colour chart for ripening. Fruit samples were sliced and dried in a solar dryer for six days. Biochemical analysis was carried out on samples of both the dried slices and fresh fruits to estimate the vitamin C content, total soluble solids, pH, titratable acidity, moisture and dry matter contents of the six varieties. The results showed significant differences ($p<0.05$) among the biochemical properties of the six varieties.The vitamin C content of the varieties ranged between 10.37 and 21.25mg/100g. High moisture content, ranging between 83.24 – 96.67 percent was recorded for the six varieties. The means of the vitamin C, moisture content, pH and dry matter content were significantly different among the six varieties studied. Although the total soluble solids ranged from 2.70 to 4.17%, there was no significant difference among the varieties. The ripening condition of the fruits did not have any significant effect on the biochemical properties studied. The study revealed that drying significantly affected the biochemical properties of tomato, except the titratable acidity and the total soluble solids. Drying significantly ($p<0.05$) reduced the vitamin C, total soluble solids, and the moisture contents of the six varieties. As expected, the pH and the dry matter content increased significantly ($p<0.05$) after drying. Significant correlations were observed among the biochemical properties studied. It can be concluded that some of the six varieties studied have appreciable levels of vitamin C, dry matter, total soluble solids and titratable acidity which could be improved for industrial purposes. In respect to the biochemical properties studied, Pawa appears to be the best variety for industrial processing because of the high Total Soluble Solid (TSS) as well as lower pH and TA values, which are important quality attributes of tomato meant for processing. Tropimech and Techimanare are recommended for fresh market because of the high vitamin C and moisture contents. Although drying could be used to preserve the nutritive value of tomatoes meant for food, it is not recommended for fruits meant for processing because it reduces the TSS content.

Key words: Tomato, varieties, drying, ripening, pH, vitamin C, biochemical properties, titratable acidity

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INTRODUCTION

Tomato (*Lycopersicum esculentum*) is one of the most widely consumed fresh vegetables in the world [1, 2]. It is one of the most important vegetable crops from nutritional, as well as,consumptional point of view. It is consumed fresh, cooked or after processing and tops the list of canned vegetables [3, 4, 5]. The edible part of the fruit is known as the power house of nutrition [6]. Tomato plays a very important role in human nutrition and well-being[7, 8]. It is a versatile fruit vegetable, making significant contributions to human nutrition throughout the world, for their content of sugars, acids, vitamins, minerals, lycopene and other carotenoids, fibre and potassium [9, 10].

Tomato is one of the popular vegetables commonly cultivated by small-scale farmers in Ghana with high per capita consumption as it is used in almost all Ghanaian homes [11, 12]. Tomato cultivation has been one of the most important income-generating vegetables produced in Ghana [13]. It is a major source of employment for both producers and all actors involved in the distribution and sale of the produce and income to both rural and urban dwellers [5, 12]. It contributes significantly to the economic growth of the country and source of foreign exchange [11, 13].

About 20 to 40 % of harvested vegetables are lost through some forms of spoilage [8]. Losses often occur from excessive deterioration during handling and marketing of the crop. This is especially acute with tomatoes harvested when at the breaker or more advanced stages of ripeness. In some cases, everything harvested may end up being sold to consumers while in others, losses or waste may be considerable [8]. There could also be losses in quality, as measured both by the price obtained and the nutritional value, as well as in quantity.The increase in the production of these vegetables usually results in gluts at harvest time and very low price, while few months after, scarcity sets in resulting in high prices [14]. The highly perishable nature of the crop limits its postharvest life [1].

Drying is a convenient method of extending the shelf life and maintaining postharvest losses of tomatoes [15]. Drying as a process for food conservation and preservation seems to be an adequate method under most conditions in the developing economies [16]. New drying techniques have increased demand for dried foods more than in the past due to improved quality and researchers are of the opinion that if more attention was given to food quality during drying, there would even be more significant boost to its demand. Dried form of tomato is becoming popular as it is extensively used in the preparation of various items like pizzas, soups, salads and other snacks. Little information is available on the effect of drying on the nutritional quality of locally grown tomato varieties in Ghana. The objective of this study was to assess the influence of the ripening condition and drying on the biochemical properties of six varieties of tomato.

MATERIALS AND METHODS

The six varieties of tomato used for the experiment were Tatiana, Techiman, Tropimech, Pectofade, Rodade and Pawa. They were obtained from different tomato growing centres of the Brong Ahafo region of Ghana. This is the leading tomato producing region located in the mid-western part of Ghana. Tatiana, Pectofade and Rodade varieties were obtained from the

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Agri-Commercial Service Ltd in Wenchi where they were grown under greenhouse conditions.Techiman, Tropimech and Pawa were obtained from different tomato producing communities within the Wenchi Municipality where they are grown under field conditions. Fresh tomato fruits from the six varieties were harvested at three ripening stages of mature green, half ripe and full ripe using the United States Department of Agriculture (USDA) colour chart for ripening [17].

Fresh fruit samples from each variety were sorted and graded according to uniformity of size, and those with defect or disease were discarded. The selected samples were then washed in water to reduce microbial population,and remove dirt and dust. The samples from each variety were divided into two portions; one part of the sample was kept fresh in a refrigerator at a temperature of 2 – 4^{o}C while the other part was dried in a solar dryer-for six days until a constant mass was obtained. Each sample was done in triplicate.

Drying of Tomato Slices
The selected tomato fruit samples were sliced to15mm thickness using a sharp stainless steel knife. The slices from each variety were placed on trays, labeled and then kept in a solar drier at temperature of about 35^{o}C –55^{o}C for six days. The solar dryer was made of a simple rectangular wooden frame covered with opaque plastic sheets, except the top side which was transparent. It had four horizontal shelves into it. It had a stand with four legs placed in a tray of water to prevent ants from climbing the dryer. The dryer and the fruits in it were carried to an enclosed area to avoid the night dew falling on it, and to prevent the reabsorption of moisture and excessive cooling, thereby prolonging the drying process. The dryer was kept in the sun for three days to heat it before placing the samples in it.The dried samples were then kept in sealed transparent plastic containers and kept temporary at room temperature for biochemical analysis.

Biochemical Analysis
Samples of the fresh and dried fruits from the six varieties were sent for analysis of their biochemical properties at the Biochemistry laboratory of the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi, Ghana.

Vitamin C Determination: This was determined using the 2,6-Dichloroindophenol Titrimetric method [18].The ascorbic acid content of the fruit was calculated as follows:

$$\text{Ascorbic acid (mg/100g)} = (X-B) \times (F/E) \times (V/Y)$$

Where:
X = Average ml for test solution titration
B = Average ml for test blank titration
F = mg ascorbic acid equivalent to 1.0ml indophenols standard solution
E = Volume of sample taken
V = Total volume of solution
Y = Volume of test solution taken

pH of Tomato Juice: The pH of the fruit samples was determined using the method described by Rangana [19]. One gram of sample was homogenized in 1ml of distilled water and 1ml of

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de-ionized water of pH 7.0. The pH of the juice was recorded using an electronic pH meter. The pH meter was standardized using a buffer solution of pH 7.

Titratable Acidity Content: Total titratable acidity was determined by first blending the samples. One hundred grams (100g) of the fruit was homogenized using a blender and the homogenized samples were filtered. Equal volume of the sample (juice) was added to the extracting solution (HPO_3-CH_3CHOOH) to obtain the total volume of solution. For the standard ascorbic acid (test solution),2.0ml acetic acid standard solution was transferred into three beakers containing 5ml of extracting solution and titrated rapidly against indophenols solution until a light but distinct rose pink persisted. Three blanks composing of 7.0ml of extracting solution was titrated against the indophenols solution.The percentage of titratable acidity was calculated using the formula:

$$\text{TTA} = \frac{\text{T x N x V}_1}{W\ x\ V_2}$$

Where,
T = Titre value,
N = Normality of NaOH,
V_1 = Volume made up,
V_2 = Volume of sample taken for estimation
W = Weight of sample.

Total Soluble Solid Content of Pulp: Total soluble solids (TSS) was determined using an Abbe Refractometer by placing two drops of pulp juice on its prism. The percentage of TSS was estimated from direct reading of the Refractometer. Temperature correction was made using the international temperature correction table for refractometer at 20^oC.

Dry Matter and Moisture Content of Fruit (%): The standardized laboratory test for moisture content was used for the determination of moisture content and subsequently the dry matter content, using the following formula below [20]:

Percentage moisture (%$MC_{(\text{wet basis})}$ = [Initial weight – final weight/initial weight]*100

Dry matter content calculation was done based on the formula:

$$\%\text{Dry Matter} = \frac{\text{M2} - \text{M0}}{\text{M1} - \text{M0}}\, x\ 100$$

Where:
M_0 = weight in gram of dish
M_1 = weight in gram of dish and sample before drying
M_2 = weight in gram of dish and sample after drying

Statistical Analysis
The data obtained from the analysis of the ascorbic acid content of tomato pulp (Vitamin C), pH of the juice, titratable acidity, total soluble solids, dry matter of pulp and moisture content of the fruits were subjected to Analysis of Variance (ANOVA) technique using the Statistical

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DOI: 10.18697/ajfand.81.16975

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Volume 18 No. 1
April 2018
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Analysis System [21]. Differences between means were separated by the least significance difference (LSD) at 95% confidence interval [21].

RESULTS

The mean values of the biochemical properties – Vitamin C content, Total Soluble Solids (TSS), the pH, Titratable Acidity (TA), Moisture Content (MC) and the Dry Matter content (DM) – of the six varieties of tomato studied as influenced by the ripening condition and drying are presented in the Tables 1 - 3.

Vitamin C content: The results showed an average vitamin C content of 11.1 mg/100g for all the ripening stages (Table 1). Thus, the ripening condition of fruits at harvest did not have any significant effect on the vitamin C content of the fruits.

From the study, the vitamin C content of the varieties ranged between 10.4 and 21.3mg/100g (Table 2). The study observed that varieties Tropimech and Techiman which were cultivated under field conditions recorded significantly higher vitamin C contents compared to Pectofade and Rodade which were cultivated under greenhouse conditions. Contrary to the above observations, Pawa which was cultivated under field conditions recorded a significantly lower vitamin C content compared to Tatiana which was cultivated under green house condition.

The results revealed that the drying process significantly ($p>0.01$) affected the vitamin C content of the fruits. The vitamin C content of the dried fruits were significantly lower ($p<0.05$) than that of the fresh fruits with means of 7.6mg and 20.8mg, respectively (Table 3).

Total Soluble Solid Content (TSS): The study observed an increase in the TSS content of the fruits from the mature green to full ripe conditions with means of 3.2 and 4.0, respectively (Table 1). However, the increase was not statistically significant. This means that the ripening conditions did not have any significant effect on the TSS content of the varieties.

The TSS content of the six varieties ranged from 2.7 to 4.2% with Pawa recording the highest and the least was Tropimech (2.7) as shown in Table 2. However, the differences in the means of the six varieties were not significant ($p<0.05$). There is no difference between the various tomato varieties in terms of the TSS content. The result also showed that drying did not significantly affect the TSS content of fruits. Although the TSS value for the dried slices (2.6) was lower than that of the fresh samples (3.1), they were not significantly different from each other (Table 3).

Titratable acidity (TA) and pH of the Juice: The ripening condition of fruits did not significantly affect the pH of the fruits. Although the pH value was lower at the full ripe stage, the means for the various ripening conditions were not significantly different ($p<0.05$) from each other (Table 1). The pH of fresh tomato fruits from the six varieties was in the range of 4.3 to 5.3 (Table 2). The drying process significantly affected the pH of the fruits. The dried fruit slices gave a significantly higher ($p<0.05$) pH value than the fresh fruits with means of 5.6 and 5.1, respectively (Table 3).

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Volume 18 No. 1
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PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

It was observed that the TA value decreased at the half ripe stage and then increased at the full ripe stage. The means at the various ripening conditions were, however, not significantly different ($p<0.05$) from each other (Table 1). The TA for the six varieties studied ranged from 0.9 to 1.5 (Table 2). The TA value was not significantly affected by the drying process, although the dried fruits had slightly higher TA value of 1.4 than the 1.3 recorded for the fresh fruits (Table 3).

Moisture Content (%): The percentage moisture content (MC) of the six varieties ranged from 83.2% to 96.7% with Tropimech recording the highest and Rodade having the least (Table 2). The result showed very high significant differences ($p>0.01$) among the MC of the six varieties. The study also revealed that drying significantly reduced the MC of the fruits. As expected, the dry samples have significantly ($p>0.01$) lower MC than the fresh fruits as shown in Table 3.

Percentage Dry Matter: The percentage dry matter (DM) decreased at half ripe and then increased at the full ripe stage (Table 1). The results of the study showed that the DM content of fruits from the six varieties ranged from 3.3 to 16.8% with significant differences ($p<0.05$) between the means (Table 2). The results also revealed a very high significant difference ($p>0.01$) between the means of the fresh and dried samples with means of 6.1 and 86.9, respectively (Table 3). Thus, the drying process significantly increased the DM content of the fruits.

Correlation among Biochemical Properties

The level of association among the various biochemical properties of the six varieties was evaluated. The results of the study revealed significant correlations among the biochemical properties studied (Table 4). The vitamin C content had a significantly positive correlation with the pH and the MC ($p>0.01$) as well as the TA ($p>0.05$). On the other hand, the vitamin C was negatively correlated with the TSS and significantly negatively correlated with the DM content ($p>0.01$). The TSS was negatively correlated with the pH, TA and the MC. This correlation was, however, not significant. There was a significant positive correlation between the pH, the vitamin C and the MC content ($p>0.01$). The pH and DM contents were also negatively correlated ($p>0.01$).

DISCUSSION

Vitamin C Content:

The study revealed significant differences in the vitamin C content of the six varieties studied. This result is similar to observation of slight differences in the vitamin C content among some varieties of tomatoes [22].

Research indicates that ascorbic acid content of tomato is affected by the ripening condition [22]. The acid content is lower in immature fruits and is highest at the stage when colour starts to appear, with rapid decrease when the fruit ripens [3]. Contrary to the above, this study showed that the vitamin C content of the fruits increased consistently as the fruits ripened. The differences in the vitamin C content among the varieties studied could be attributed to varietal differences since the differences observed at the various ripening stages was not

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DOI: 10.18697/ajfand.81.16975

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AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 18 No. 1
April 2018
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

significantly different. Some factors that could contribute to the differences in the vitamin C content, in addition to the varietal differences, include the agronomic practices of the farmer, soil characteristics and the environmental conditions.The study observed that varieties cultivated under field conditions recorded significantly higher vitamin C contents compared to those cultivated under greenhouse conditions. Research indicates that the method of farming and type of fertilizers used influenced the concentration of antioxidant components, the amount of phenolic compounds and ascorbic acids in tomatoes [23]. Temperature and relative humidity may also have an effect on the vitamin C content of the tomato fruit [3, 24]. For farmers to produce fruits of higher quality, it is important for them to follow the recommended agronomic practices for each variety. The refusal or inability of farmers to adopt improved agronomic practices and apply the right dosage of recommended fertilizers will eventually affect the biochemical composition of the fruits produced.

The study also revealed that drying significantly reduced the vitamin C content of the fruits (Table 3). This confirms observations from other studies which reported a decrease in the ascorbic acid content of tomato fruits after semi- and freeze drying [24, 25]. Ascorbic acid is freely soluble in water; therefore, as the water content of the fruit decreases during the drying process, the vitamin C content also reduces. Vitamin C is also susceptible to decomposition during processing. There is the possibility of vitamin C oxidation during the process of drying when temperature exceeds 21°C. It is oxidised in the presence of air to dehydroascorbic acid, which has no vitamin C activity [26]. The higher the drying temperature, the lower the vitamin C content of the dried fruits [27]. The decrease in vitamin C content recorded in this study can be attributed, partly, to the significant loss of water in addition to the destruction of ascorbic acid to dehydroascorbic acid during the drying process since the drying temperature was above 30°C.

It is, therefore, advisable for tomato fruits to be consumed fresh so that consumers can enjoy the full nutritional benefit of vitamin C in the fruits. In situations where drying is inevitable, it should be done at temperatures below 20°C in order to avoid vitamin C decomposition through oxidation.

The results of the study imply that if dried slices of tomatoes are to be used in foods, greater quantities would be required to meet the dietary requirement measured by the recommended daily allowance (RDA) of about 75 mg per day for adults (aged 15 or older), less for children, and more for pregnant and lactating women [28].

Total Soluble Solid (TSS) Content
The TSS is a refractometric index that indicates the proportion (%) of dissolved solids in a solution [29]. It is the sum of sugars (sucrose and hexoses; 65%), acids (citrate and malate, 13%) and other components (phenols, amino acids, soluble pectins, ascorbic acid and minerals) in the tomato fruit pulp [3]. The results of this study did not reveal any significant effect of drying on TSS content of the fruits. Although the dried slices had lower TSS than the fresh samples, they were not significantly different. This is an indication that the quality of the tomato fruits in terms of the TSS was not affected by the drying process. Research has shown that sugar content is positively correlated with TSS in tomato fruit and in most cases this correlation is high [29, 30]. The amount and types of sugars stored in tomato fruit are a

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major constituent of postharvest tomato quality by affecting the taste and overall fruit quality [3, 29].

The results indicated that there was no significant difference between the TSS content of the various tomato varieties studied. This is contrary to reports that variety has effect on the TSS content [29]. The results of this study could be attributed to similar cultivation conditions and agronomic practices adopted by farmers. Farmers within a particular growing area in Ghana adopt similar agronomic practices whether approved or not and hence they usually get similar results. It has been reported that about 44.8% of the variation between the TSS content of tomato fruits is due to varietal differences. Total Soluble Solid is an important quality parameter for suitability of tomato in industrial processing for the production of paste. High TSS increases paste efficiency. Earlier studies have reported minimum TSS value to be around 4.5%, which is considered low for industrial tomatoes [3, 32]. It has been established that TSS content of 4.8 – 8.8% is an indication of the highest quality of industrial tomato [33]. From this study, only the variety Pawa, which gave a TSS value of 4.2% came close to the reported minimum level. This indicates that the other five varieties studied do not meet the recommended minimum requirement for industrial purposes. Farmers would have to change the variety they produce if they intend to produce for industrial purposes. They also have to follow the recommended agronomic practices for each variety in order to make some economic gains.

Titratable Acidity and pH of the Juice

The optimum pH value for ripe tomatoes has been found to be around 4.25, the acidity being primarily caused by the citric acid content of the fruits. During ripening, pH in tomatoes increases and may exceed the recommended pH value for food safety in over-mature tomatoes. The addition of citric acid may be required to obtain the correct pH to ensure food safety and taste [34]. Acidity contributes to both taste and food safety as it hinders the spoilage of food by microorganisms. It has been reported that tomato fruits with pH value of below 4.5 are a desirable trait because it halts proliferation of microorganisms in the final product during industrial processing [35]. Studies indicate that pH is a key factor in tomato selection [36]. It is suggested that appropriate pH value for industrial tomato should be between 4.18 and 4.4 [32]. The results of this study showed clearly that four out of the six varieties – Tropimech, Tatiana, Techiman and Rodade – had pH values above 4.5 and thus may not be suitable for industrial purposes.Two of the varieties, Pawa and Pectofade with pH values of 4.2 and 4.4, respectively fall within the FAO/WHO requirement for desired tomato varieties of pH below 4.5 [32]. Although farmers could cultivate the other varieties for home consumption, they have to switch to these two suitable varieties if they want to produce for industrial purposes.

Titratable acidity value greater than 0.35 has been suggested as desirable for processing tomato[35]. In this study, TA values greater than 0.35 were recorded for all of the six varieties, indicating that the varieties are good for processing. Although the dried fruits recorded higher TA values than the fresh fruits, they were not significantly different. This result suggests that dried fruits could be used in the same way as fresh fruits as far as the TA content is concerned since drying had no significant effect on the TA content.

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Percentage Dry Matter and Moisture Content

Fruits and vegetables contain large quantities of water in proportion to their weight. Tomato fruits contain about 93% moisture. In most fleshy or succulent postharvest products, moisture content is often closely tied to product quality and a low moisture content is not desirable.

The results of this study showed very high significant differences among the MC of the six varieties studied. It also revealed that drying significantly affected the MC of the fruits. The moisture content of postharvest products can have a pronounced effect on the rate of respiration. In general, high rate of respiration and metabolic processes are influenced by the moisture content of the fruit, leading to reduction in shelf life and deterioration of quality [3]. The rate of absorption of moisture is nearly directly proportional to that of transpiration, a phenomenon of water loss [37]. It can be said that since drying significantly reduced the moisture content of the fruits, it can effectively preserve and prolong the shelf life of tomato. Drying decreases the rate of respiration and other metabolic processes which facilitate the deteriorationof fruits, leading to loss of food and income.

Significant differences were observed in the DM components of the six varieties studied. This confirms earlier reports [38]. The DM content is one of the important quality parameters for both fresh market and processed tomatoes. High DM is desired in processing paste products because they improve the quality of the processed product [35]. A DM of 6.20 for fresh tomato cultivars has been reported and it is recommended that the average DM of the ripe fresh tomato fruit must be at least 5% [39]. The results of this study suggest that apart from Tropimech with DM of 3.33, the other varieties had DM above the 5% recommended. Therefore,these varieties could be members of the high DM content variety group recommended for processing paste products [34]. Due to the significant effect of drying on the DM of the tomato fruits, tomatoes meant for processing should not be dried. The dried fruits could be used in the preparation of several other kinds of food.

CONCLUSION

The study has shown that significant differences exist in the biochemical properties of the six tomato varieties. Significant correlations were observed among the biochemical properties studied. The six varieties have appreciable levels of Vitamin C, DM, TSS and TA, which could be improved to meet the recommended level of desirable traits for industrial tomato processing. Considering the biochemical properties studied, Pawa appears to be the best variety for industrial purposes due to the high TSS content as well as lower pH and TA values, which are important quality attributes of tomato meant for processing. Tropimech and Techiman are recommended for fresh market because of the high vitamin C and moisture contents. The study revealed that drying significantly affects the vitamin C content, pH of the juice, MC and the DM content of the fruits. Drying could be used to preserve tomatoes meant for food due to its ability to decrease the rate of respiration and other metabolic activities which facilitate the deterioration of fruits. However, it would not be advisable to dry fruits meant for processing because it reduces the TSS content, an important quality parameter for suitability of tomato in industrial processing.

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DOI: 10.18697/ajfand.81.16975

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AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 18 No. 1
April 2018
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Table 1: Biochemical Properties as Influenced by the Ripening Stage of the Fruit

Variety	Vitamin C	pH	Titratable Acidity	TSS	Dry Matter (%)
Mature green	11.1[a]	4.4[a]	10.5[a]	3.2[a]	14.1[a]
Half ripe	11.1[a]	4.5[a]	10.2[a]	3.2[a]	13.6[a]
Full ripe	11.1[a]	4.4[a]	11.2[a]	4.0[a]	14.6[a]
P-value	0.884	0.305	0.298	0.687	0.143
LSD (5%)	0.241	0.160	1.527	2.882	1.027

Means bearing the same letters in the same column are not significantly different (P≥0.05)

TSS- Total Soluble Solids

Table 2: Biochemical Properties As Influenced By the Variety

Variety	Biochemical Properties					
	Vitamin C (mg/100g)	TSS (%)	pH	Titratable Acidity	MC (%/g)	Dry Matter (%)
Tropimech	21.1±0.37 [d]	2.7± 0.38 [a]	4.9± 0.01 [d]	1.5± 0.07 [c]	96.7± 0.73 [f]	3.3± 0.21 [a]
Tatiana	20.0±0.31 [c]	3.4± 0.22 [a]	5.3± 0.00 [f]	1.0± 0.10 [a]	90.8± 0.73 [d]	9.2± 0.73 [c]
Techiman	21.3± 0.36 [d]	3.0± 0.60 [a]	5.2± 0.01 [e]	1.4± 0.09[bc]	94.2± 0.17 [e]	5.8± 0.17 [b]
Pectofade	11.3± 0.08 [b]	3.1± 0.97 [a]	4.4± 0.02 [b]	1.3± 0.06 [b]	85.8± 0.48 [b]	14.2± 0.47 [e]
Rodade	11.7± 0.03 [b]	3.2± 0.41 [a]	4.5± 0.07 [c]	0.9± 0.03 [a]	83.2± 0.34 [a]	16.8± 0.34 [f]
Pawa	10.4± 0.04 [a]	4.2± 0.44 [a]	4.3± 0.02 [a]	1.0± 0.02 [a]	88.7± 0.13 [c]	11.3± 0.13 [d]

Means bearing the same letters in the same column are not significantly different (P≥0.05)

TSS- Total Soluble Solids, MC- Moisture Content

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ISSN 1684 5374

Table 3: Biochemical properties as influenced by drying

Biochemical Properties	TREATMENT	
	Fresh	Dried
Vitamin C (mg/100g)	20.8± 0.26[a]	7.6± 0.15[b]
Total Soluble Solids (%)	3.0 ± 0.19[a]	2.6 ± 0.53[a]
pH	5.1 ± 0.06[a]	5.6 ± 0.10[b]
Titratable Acidity	1.3 ± 0.08[a]	1.4 ± 0.19[a]
Moisture Content (%/g)	93.9 ± 0.90[a]	13.2 ± 0.78[b]
Dry Matter (%)	6.1 ± 0.90[a]	86.9 ± 0.77[b]

Means bearing the same letters in the same row are not significantly different (P≥0.05)

Table 4: Correlation between Biochemical properties of tomatoes

Property	Vit_ C	TSS	pH	TA	MC	DM
Vit C	1	-0.308	0.924**	0.499	0.848**	-0.848**
TSS	-0.308	1	-0.234	-0.307	-0.256	0.256
pH	0.924**	-0.234	1	0.231	0.638**	-0.638**
TA	0.499*	-0.307	0.231	1	0.648**	-0.648**
MC	0.848**	-0.256	0.638**	0.648**	1	-1.000**
DM	-0.848**	0.256	-0.638**	-0.648**	-1.000**	1

** Correlation is significant at 0.01 level (2-tailed)

* Correlation is significant at 0.05 level (2-tailed)

TSS- Total Soluble Solids MC- Moisture Content

TA- Titratable Acidity DM- Dry Matter

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