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EFFECT OF DURATION AND DRYING TEMPERATURE ON CHARACTERISTICS OF DRIED TOMATO (*Lycopersicon esculentum* L.) COCHORO VARIETY

– Research paper –

Mawardii YUSUFE, Ali MOHAMMED, Neela SATHEESH[1]

Department of Postharvest Management, College of Agriculture and Veterinary Medicine, Jimma University, Ethiopia

Abstract: The objective of the present study was to standardise the duration and temperatures of the conventional oven drying methods for best physical and sensory characteristics of dried tomato. The experiment consisted of two factor factorial design (3*2) with three levels of drying temperature (70ºC, 80ºC and 90ºC) and two levels of drying duration (7 and 8 hours) with three replications. An improved and high yielding variety (Cochoro) of tomato released in 2007 for processing and widely grown in *Ziwai* (Maki), Ethiopia was used. Prior to drying, individual tomato fruits were washed and sliced into uniform thickness (8mm); then, the slices were placed on to the drying trays in a single layer to facilitate uniform drying in hot air oven set at predetermined temperatures per the respective treatments. Data were collected on different physical and sensory attributes and analysed using SAS software (version 9.2). The results showed that titratable acidity, total soluble solids and water absorption capacity were significantly ($p \leq 0.001$) increased due to the interaction of degree of temperature and duration of oven drying. In contrast, pH and water activity decreased as the drying temperature and duration increased. Drying at 70^0C for 7 hours produced dried tomatoes with the highest sensorial acceptability and physical attributes while higher temperatures (80, 90^0C) and longer duration (9 hours) significantly detract the quality of dried tomato. Hence, it is possible to add value and preserve tomatoes through oven drying at the right temperature and optimum duration.

Keywords: Dried tomato, Water absorption capacity, Overall acceptability, Water activity, Overall acceptability

INTRODUCTION

Tomato is one of the popular crops in the world including the tropical countries. Owing to its rich source of vitamins and minerals, tomato is playing an important role in human diet (Lorenz, 1997). In the year 2014, tomato produced in Ethiopia was close to 55, 000 tons which was expected to increase by 2016 (FAOSTAT, 2016). Similarly, tomato production in the world in 2016 was estimated to be 37,814,000 metric tons (WPTC 2016).
Tomato is ranked first among all vegetables in terms of its nutritional contribution to the human diet (Splittstoesser, 1990). Tomato is utilised in greater amounts as fresh (salad), processed products (Beverages, Concentrates, sauces and canned assortments) (Akanbi et al., 2006) and dehydrated products (component for pizza, different vegetable and spicy dishes).
In recent times, both the fresh and different processed tomato products have gained consumers' interest because of their potential antioxidant activity. Tomatoes are good sources of basic nutrients and different bio-active ingredients like carotenoids, lycopene and other flavonoids, phenolic acids and ascorbic acid (Vitamin C) (Slimestad &Verheul, 2009; Veillet et al., 2009). Tomato is the best source of antioxidant vitamins like vitamins A, C and E, along with its huge amount of lycopene and polyphenols which are non-nutritive antioxidants (Chang et al., 2006). Extensive medical researchers reported that lycopene helps the human body fight against different types of cancers (prostate, breast), atherosclerosis and reduce blood cholesterol levels (Kerkhofs et. al., 2005; Xianquan et al., 2005).
Tomato cultivation is highly seasonal, huge quantities are available at right season of the year. Being one of the highly perishable vegetables in nature, large quantities of the produce are wasted during peak harvesting periods of the crop. The price of the fresh tomato shows high fluctuation between the

[1] Corresponding author. E-Mail address : neela.micro2005@gmail.com

seasons, some off-seasons tomatoes are not available in the market for consumers. In order to reduce the post-harvest losses of tomato, it is rationale to process it to different products; the demand for processed tomato products also has increased now-a-days (Verlent et al., 2006).
Different researchers reported various techniques for tomato shelf life extension, including, manipulation of storage environment (temperature and relative humidity) (Esa et al., 2015), addition of chemical preservatives, waxing or edible coatings (Tuba et al., 2011), use of modified atmosphere packaging (Majidi et al., 2014), drying and product formulations. But, the success of these methods depends on requirements of the product quality for consumption. On the other hand most of the reported methods cannot extend shelf life for longer durations.
Drying is an ancient technique in Mediterranean countries where people used to dry their foods for preservation. Drying is the best and convenient technique among all the food preservation and processing methods, for product moisture content is greatly lowered which in turn helps to prevent the microbial degradation (Fellows, 2009). In addition, both volume and weight of dried products are noticeably decreased after drying, which can minimize the cost of packaging, storage and transportation (Doymaz, 2007).
Among the drying techniques, open sun drying is a seasoned, simple (requires less technology), cost effective and familiar food preservation method used to reduce the moisture contents of all agricultural commodities (Durance & Wang, 2002). Nonetheless, the quality of products can be seriously tainted and occasionally rendered inedible in open sun drying because of the potential risk from environmental problems (rain, storm, windborne dirt, dust) and biological hazards (infestation by insects, rodents and other animals). Thus the resulting products may become inferior in their quality and bring adverse economic effects both in domestic and international markets (Lahsasni et al., 2004; Tiris et al., 1996). The sun drying technique has the advantages of minimalism and reduced principal investments, but it requires lengthy drying times (Andritsos et al., 2003).
To enhance the superiority and value of the dried foodstuffs, the conventional open sun drying method should be substituted with modern industrial drying methods such as solar and hot-air dryings (Ertekin &Yaldiz, 2004; Diamante & Munro, 1993). Convective hot-air drying is widely used as a preservation technique on industrial scale. Nevertheless, drying at elevated drying temperatures (60–110^{0}C) and long exposure time (2–10 h) leads to the degradation of some nutritional properties (loss in ascorbic acid, lycopene, flavonoids). Moreover, some physical properties are also affected during the drying process, for instance, increase in shrinkage and hardiness, decrease in both the rehydration capacity and bulk density of the dried product, severe damage of the sensorial properties like flavour and colour. However, both physical and sensory properties are very important attributes dried products that often receive appreciation from the customers.
In present days, diverse drying techniques like hot-air drying, solar-tunnel drying, microwave drying and freeze-drying are among the novel and sophisticated methods employed by different researchers to dry and preserve tomatoes (Ratti & Mujumdar, 2005; Chang et al., 2006; Latapi & Barrett 2006a, 2006b; Heredia et al., 2007). However, some methods demand the use of costly technology and equipment, which may not be available in low income, underdeveloped countries like Ethiopia.
Hence, the main objective of the present study was to standardise the duration and temperatures of the conventional oven drying methods for best physical and sensory characteristics of dried tomato.

MATERIALS AND METHODS

Raw materials collection

An improved variety (Cochoro) of tomato which is widely grown in *Maki* area and known for its superior performance was collected from a local farmer in *Ziwai* (Maki), Ethiopia. Cochoro, which was released from Melkassa Agricultural Research Center in Ethiopia in 2007, is characterized as processing type tomato having compact and determinate growth habit with strong stem. This variety has oblong fruits shape, fruit weight of 76 g, maturity period of 86 days and a potential yield of 46.3 tons per hectare. The tomatoes were freshly handpicked from the field at light red maturity stage, transported carefully to the department of postharvest management laboratory in College of Agriculture and Veterinary Medicine, Jimma University and allowed ripen to uniform red ripe stage.

Experimental design

The present study was carried out by using a two factor factorial design. The first factor represented the drying temperature with three levels (70^0C, 80^0C and 90^0C) and second factor was time of drying with two levels (7 and 8 hours) with triplicates, the total runs conducted in this study being 18.

Sample preparation and drying process

Prior to drying, individual tomato fruits were measured by callipers and cut into 8mm thickness slices using sharp stainless steel knife (Jayathunge et al., 2012). To get uniform drying, tomato slices were placed in single layer for drying in hot air oven at predetermined temperatures of 70^0C, 80^0C and 90^0C for the duration of 7 and 8 hours, which were fixed based on preliminary trials. Finally dried tomato slices were cooled for about an hour inside desiccators to prevent re-absorption of moisture and packed in polythene bag for analysis and stored in dry place for determination of different physical and sensory properties. The detailed procedure of drying is given in Figure 1.

Physical properties

Total soluble solids (TSS): Five grams (5g) of grounded sample was dissolved in 50ml distilled water and the solution was vigorously shaken to obtain uniform sample. TSS was measured by hand Refractometer (DR201-95, Germany). The hand refractometers prism was cleaned thoroughly with distilled water and wiped to dry with a clean laboratory tissue. A drop of the sample was placed on the prism of refractometer and the lid was closed. The readings were taken by the graduated mark which indicates the total soluble solids value of the sample and was recorded in degree Brix (^{0}Brix) (Owoso et al., 2000).

Determination of pH: Five grams of sample was grounded, suspended in 50ml of distilled water and the solution was shaken well. After calibration of pH meter, pH values of the samples solutions were measured (Ibitoye, 2005).

Determination of titratable acidity: Titratable acidity was determined using Pearson's, (1981) method. Phenolphthalein was used as indicator and titrated against 0.1N Sodium hydroxide to light pink colored end point. Calculation is given in Eq. 1.

Water absorption capacities (Rehydration Capacity): The determination of water absorption capacities was carried out according to Lewicki (1998). Two grams of dried tomato sample powder was weighed (initial weight) into 250 ml beakers and 50 ml of distilled water was added at room temperature and kept aside for 2.0 hours and the water was filtered through filter paper by vacuum pump (D-7800, German) until all the water was drained out and the stick water was removed by laboratory tissue paper and finally weight of water absorbed samples were taken (final weight). Finally, water absorption capacities were determined according to the formula (2).

Water activity: Lab Master-water activity instrument (Novasina AG, CH-8853 Lachen) was used for determination of water activity of dried tomato samples. A homogenous powdered sample was placed in a sample cup, by completely covering the bottom of the cup. Then, prepared samples were placed in the sample chamber followed by carefully closing of chamber door. Water activity was reported directly which obtained from the display.

Sensory evaluation

Dried tomato samples were rehydrated and subjected for sensory evaluation in order to assess consumers' reaction with regard to colour, flavour, mouth feel, taste, appearances and overall acceptability of the dried tomato samples (Jayathunge et al., 2012). Fifty members of untrained panelists were selected from students, laboratory technicians and academic staff member of postharvest department. All samples were coded and randomly placed and participants were asked to evaluate the colour and flavour, mouth feel, taste, overall acceptability of the dried tomatoes using by a five point hedonic scale, where 1= dislike extremely, 2 = dislike moderately, 3 = neither like nor dislike, 4 = like moderately and 5 = like extremely. Assessors are instructed to clean palate with water after assess each sample before going to the next one.

Statistical Analysis

Initially, all the collected data from objective measurements and subjective assessments were checked for normality, and variance homogeneity and Analysis of Variance (ANOVA) was done by SAS version 9.2 (SAS Institute Inc., 2008). Data were compared on the basis of standard deviation of the mean values. Every significant treatment effect within the evaluated parameters was compared using Tukey at 5% probability level (Montgomery, 2013).

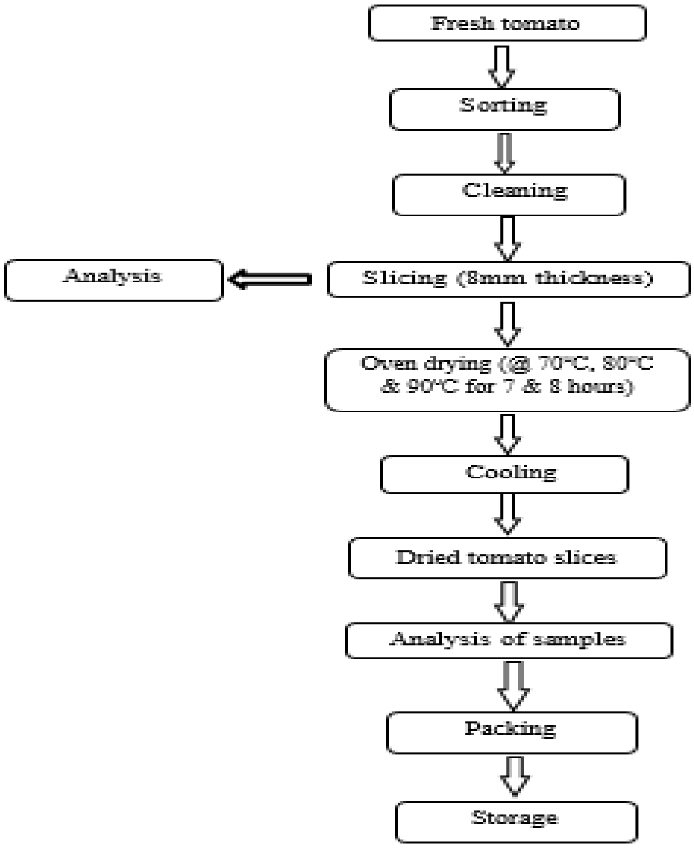

Figure 1. Flow diagram showing the detail procedure of oven drying of tomato (Modified from Mozumder et al., (2012))

$$\% \text{ of Titratable acidity} = \frac{ml\ of\ NaOh\ consumed * Normality\ of\ NaOH * Equivalent\ weight\ of\ Acid}{Sample\ Volume\ in\ ml} x100 \quad (1)$$

Equivalent weight of acid =0.0064 (Citric acid)

$$\text{Water absorption Capacities} = \frac{Final\ Weight\ of\ the\ sample - Initial\ weight\ of\ the\ sample}{Initial\ sample\ weight} \quad (2)$$

RESULTS AND DISCUSSION

Influence of parameters on the physical characteristics of dried tomatoes

TSS content is significant in determining the suitability of tomato varieties for processing. From total soluble solid content 50– 65% are sugars (glucose and fructose), and their quantity and ratios influences the organoleptic quality of tomatoes (Adedeji et al., 2006). The left over soluble solids are mainly citric and malic acids, lipids and other constituents in lower proportions.

The TSS contents of tomato were significantly ($p \leq 0.001$) increased after drying, it was affected by interaction of both duration and temperature of drying. The maximum value (53.5) was recorded in samples dried at 70ºC for 7 hours and the minimum value (7.3) was recorded in control (fresh) sample (Table 1). However there was no statistically significant difference between samples dried at 70ºC for 7 and 8 hours. Also there is no statistically significant difference in TSS between samples dried at 80ºC for 7, 8 hours and 90ºC for 7 hours. The reduction in moisture content in the fresh produces is typically happened along with an amplified percentage of TSS, since TSS is the most important factor of dry matter and concentration process (Malundo et al., 1995). On the other hand high TSS is desirable to yield superior recovery of processed products. The result is also in conformity with Dereje et al. (2009) who indicated that value of TSS contents of tomato significantly increased after drying at 55ºC, 65ºC and 75ºC.

However, the total soluble solid contents were reduced at higher temperatures for long duration of drying; this could be due to high drying temperature and long drying time, which may degrade the sugars. In line to this, Khazaei et al. (2008) reported that the TSS value rise with increment in drying-air temperature but decline beyond 80ºC. The result is also in agreement with findings of Idah et al. (2014) who reported that drying at high temperatures (50˚C, 60˚C and 70˚C) reduces the soluble solids content (31.650%, 30.558% and 29.833%) of the end product.

There was a significant ($p \leq 0.001$) variation in pH value among dried and control (fresh) samples due to the interaction effect among duration and temperature of drying. The highest (4.57) and lowest (4.31) reported in both control and samples dried at 90ºC for 8 hours respectively. But there were no statistically significant difference between samples dried at 70ºC for 7, 8 hours and 80ºC for 7 hours and also between samples dried at 90ºC for 7 hours and 80ºC for 8 hours.

The result revealed that the pH of tomato decreased as temperature and duration of drying increased; this may be associated with the increase in titratable acidity. According to Giordano et al. (2000), pH below 4.5 is an advantageous attribute, since it arrests the development of microorganisms in the finished product during industrial processing. According to Campos et al. (2006), appropriate pH values for industrially dried tomato are ranging between 4.3 and 4.4.

Citric acid is the most important acid present in tomato and it is significantly decisive factor in consumer acceptance of the processed products since a high value associates to a satisfactory acidic flavor. Significant ($p \leq 0.001$) difference was observed in TA as it was affected by the interaction among duration and temperature of drying. The highest value (0.27g/L) was found in samples dried at 90ºC for 8 hours while the lowest value (0.17 g/L) was from the control (fresh) samples.

The results indicated that titratable acidity was increased with temperatures and duration of drying. During drying process, a rise in acidity is chiefly attributed to the high amount of moisture lost from the samples and decreasing of pH. These values were in agreement with the outcomes reported by Abdalla et al., (2014) who observed an increase in titratable acidity of sample oven dried at 60ºC, 65 ºC, 70 ºC, 80ºC, and 90 ºC for two days and shade dried for four days than fresh tomato sample. Purkayastha et al., (2013) also reported that as drying temperature increased the titratable acidity was increased in dried tomato.

In this study, water absorption capacities of dried tomato was evaluated at 120 min. Significant ($p \leq 0.001$) differences were observed between dried tomato samples in respect of their water absorption capacities as influenced by interaction effects of duration and temperature of drying. The maximum water absorption capacity (3.4) was found in samples dried at 90ºC for 8 hours while the minimum (2.4) was recorded in samples dried at 70ºC for 7 hours (Table 1). Water absorption capacities of the dried tomato were increased with the duration and temperature of drying; In fact, it is generally accepted that samples dried at high temperatures possess higher rehydration capability than those dried at low temperatures (Jamradloedluk et al., 2007). This can be attributed to the formation of a more porous organization in the products at high drying temperatures, which facilitates rehydration. It is also due to the fact that the rate of moisture elimination at higher drying temperatures is very quick and leads to the minimal shrinkage of the dried samples. Similar results were reported by Ahmadzadeh and Ghiafeh (2010) who stated that tomato slices dried at 65±2°C for 6 hours showed water absorption capacity of 3.96. According to Krokida & Marinos (2003) the rehydration ratio of naturally dried samples was the lowest than oven dried samples.

There was a significant ($p \leq 0.001$) difference between the water activity of dried and control (fresh) tomato samples. The maximum (0.92) and minimum (0.39) water activities of tomatoes, were observed in control (fresh) and samples dried at 90ºC for 8 hours respectively (Table 1). However there was no statistically significant divergence between samples dried at 90^0C for 7 hours, 70^0C and 80^0C for 8 hours. The results revealed that as temperature and duration of drying increased water activity decreased. This could be attributed to drying procedure (high temperature and long duration of drying) which decreased the water activity of dried product.

Table 1. Interaction effects of temperatures and duration of drying on physical properties of dried tomato (pH, TSS, Titratable Acidity, Water absorption capacities and Water activity)

Duration (hour)	Temperature (^{0}C)	pH	TSS (^{0}Brix)	TA(g/l)	Water absorption capacity	Water activity (a_w)
Fresh		4.57^a	7.30^c	0.17^e	NA	0.92^a
7	70^{0}C	4.53^a	53.50^a	0.20^d	2.40^d	0.55^b
	80^{0}C	4.45^{cb}	50.00^{ab}	0.23^{cdb}	2.70^{cd}	0.46^c
	90^{0}C	4.36^{cd}	46.75^{ab}	0.24^{cab}	3.00^{cb}	0.44^{cd}
8	70^{o}C	4.46^{cab}	50.8^a	0.21^{cd}	3.00^{cb}	0.44^{cd}
	80^{0}C	4.38^{cd}	47.5^{ab}	0.26^{ab}	3.10^{ab}	0.43^{cd}
	90^{0}C	4.31^d	42.5^{cb}	0.27^a	3.60^a	0.39^d
CV (%)		0.96	6.38	5.10	12.6	4.02

NA=Not applicable.
Values in column with diverse letters as superscripts are significantly different at $p<0.05$

Similar observation was reported by Jayathunge et al., (2012) observed that water activity of 0.84 for fresh samples which was higher than the water activity (0.61) of tomato powders dried in air flow dryer at 55^{o}C for 48 hours. Since water activity affects the shelf life of food, under such low water activity a few deteriorative processes in foods are mediated by water. The samples with high a_w are more susceptible to microbial spoilage (Owureku et al., 2014). The low water activity observed in present study is a good indicator of enhanced shelf stability of the finished product. However, the storage conditions also play an important role in this matter.

Influence of parameters on the sensory acceptability of dried tomatoes

Sensory acceptability is the decisive measure of product quality. Sensory analysis includes a variety of influential and sensitive tools to determine human responses to food products.

Colour is one of the most significant quality limiting attributes in dehydrated fruits and vegetables. Certainly, possible colour changes would dictate the organoleptic characteristics of dried tomato samples and would limit their intended uses (Garau et al., 2007).

Consumers opt for colour of dried samples which red, not burnt or browned. The result showed that the colour acceptability was significantly affected ($p\leq0.001$) by the interaction of duration and temperature of drying. The highest mean score of colour (4.98) was recorded for control (fresh) sample while the lowest mean score (2.2) was recorded in samples dried at 90^{0}C for 8 hours (Table 2). However, no significant difference was identified between samples dried at 70°C for 7 hours and control (fresh) tomato samples. Colour of these samples was bright red as a result panellist appreciated the colour of this sample (4.93) and they were followed by samples dried at 80^{o}C for 7 hours (4.26).

The results revealed that colour acceptability of tomato decreased as temperature and duration of drying increased. This change can be either due to degradation of pigments (lycopene) or browning reaction (Millard reactions) or both during dehydration (Lopez et al., 1997; Shi et al., 1999). Similar phenomenon was observed by Mozumder, et al., (2012) who declared the colour quality of fresh tomato was higher than tomato samples oven dried at 60^{o}C.

Highly significant ($p\leq0.001$) difference was noted between the flavor of dried and control (fresh) samples as affected by interaction among duration and temperature of drying. The result indicated that the highest (4.7) and the lowest (2.08) score were recorded for samples dried at 70^{o}C for 7 hours and in samples dried at 90^{o}C for 8 hours respectively (Table 2). This may be because of the fact that dried tomatoes do have characteristic diverse flavor than fresh tomatoes as a result of heat application (Hui and Clark, 2007). However, there was no statistically significant difference between samples dried at 90^{o}C and 80^{o}C for 7 and 8 hours and their scores were close to the “neither like nor dislike” level on the 5-point Hedonic scale.

The results in Table 2 show that flavour acceptability was decreased as temperatures and duration of drying increased. The difference in aroma is primarily due to loss and generation of volatile compounds during the drying process and the decreasing of flavour has been noted at high temperature for long duration (Sacilik and Unal, 2005; Fernando et al., 2008; Rasouli et al., 2011). The drying processes generally alter the flavour characteristics of the product as the heating process transforms and drives away many of the volatile compounds. The result is similar with observation of Puranik et al. (2012) who stated that the deterioration of aroma during drying of vegetables started just as the temperature increased above 50°C and the trend was similar up to 75°C. Mitra et al. (2011) also reported that the increase in temperature resulted in a slight reduction of flavour in vegetables vacuum dried at 50ºC to 70ºC.

Table 2. Interaction effects of temperatures and duration of drying on Colour, Flavor and Taste, mouthfeel, Appearance and overall acceptability of dried tomato

Duration (hours)	Temperature (^{0}C)	Color	Flavor	Taste	Mouth feel	Appearance	Overall acceptability
Fresh		4.98^{a}	3.37^{d}	3.19^{cd}	3.20^{b}	3.81^{bc}	3.31^{c}
7	70°C	4.93^{a}	4.76^{a}	4.4^{a}	4.03^{a}	4.35^{a}	4.30^{a}
	80°C	4.26^{b}	4.08^{b}	3.50^{c}	3.28^{b}	3.56^{c}	3.60^{b}
	90°C	2.89^{e}	2.94^{e}	2.98^{ed}	3.05^{b}	3.07^{d}	3.13^{c}
8	70°C	3.79^{c}	3.70^{c}	3.98^{b}	3.78^{a}	3.86^{b}	3.71^{b}
	80°C	3.20^{d}	2.92^{e}	3.24^{cd}	2.99^{b}	2.83^{d}	3.21^{c}
	90°C	2.10^{f}	2.08^{f}	2.84^{e}	2.56^{c}	2.14^{e}	2.15^{d}

Values in column with different letters as superscripts are significantly different at $p<0.05$.

Taste scores were significantly ($p≤0.001$) affected by interaction between duration and temperatures of drying. The highest score (4.42) rating "like moderately" was observed in sample dried at 70ºC for 7 hours while the lowest score rating (2.8) was observed for samples dried at 90ºC for 8 hours (Table 2). However there was no statistically significant difference between samples dried at 80^{0}C for 8 hours and the control. As the temperature and duration of drying increased, the taste acceptability of dried samples was decreased. This could be due to the loss of volatile compounds during the drying process (Hussein et al., 2016).

Mouth feel scores were significantly ($p≤0.001$) affected by interaction among duration and temperature of drying. The highest score (4) was recorded in sample dried at 70ºC for 7 hours which scored "Like moderately" while the lowest score (2.5) was for the samples dried at 90ºC for 8 hours scored "Dislike moderately" (Table 2). However, there were no statistically significant differences between samples dried at 70ºC for 7 and 8 hours; between control (fresh) and sample dried at 80ºC, 90ºC for 7 hours, and 80ºC for 8 hours. The mouth feel acceptability of dried tomato decreased as temperatures and duration of drying increased (Guadalupe & Diane, 2006).

Significant ($p≤0.001$) difference in appearance quality among dried samples and the controls was affected by interaction effect of duration and temperature of drying. The maximum (4.06) and minimum (2.14) scores were founded in samples dried at 70ºC for 7 hours which was rated "liked moderately" and the dried sample at 90ºC for 8 hours rated "Disliked moderately" on 5-point Hedonic scale respectively. The result showed that acceptability of dried tomato samples in terms of appearance decrease as temperature and duration of drying increased; this may be due to high temperatures and long duration of drying that affect appearance quality of dried tomato. Similar results were observed by Puranik et al. (2012) who reported that very small changes on appearance acceptability at lower temperatures of drying unlike significant changes found at higher temperatures (50ºC-70ºC) in dried vegetables.

With respect to the overall acceptability of tomato samples there was a significant ($p≤0.001$) difference between dried and control samples as affected by interaction of duration and temperatures of drying. The maximum (4.3) overall acceptances was scored in samples dried at 70ºC for 7 hours which were rated 'liked moderately' and the minimum score (2.1) in samples dried at 90ºC for 8 hour

with a rating of 'Disliked moderately' on 5-point Hedonic scale.
However, there was no statistically significant difference between samples dried at 80°C for 7 hours and 70°C for 8 hours and also between control (fresh) and samples dried at 80°C for 8 hours. Similar with other sensory quality attributes observed in present study, the overall acceptance also decreased as temperature and duration of drying increased; this may be due to high temperatures and long period of drying (Hussein et al., 2016; Urban et al., 2015).

CONCLUSIONS

Drying is one of the earliest techniques employed for preservation of food products. The desirable physical properties of dried tomato were achieved by the increase in both drying temperature and duration of drying. The best pH (4.31), Titratable acidity (0.27), Water absorption capacity (3.60), and water activity (0.39) were obtained in the samples dried at 90^0C for 8 hours of drying time. However, in terms of Total soluble solids, the highest (53.5) was observed in those samples dried at 80^0C for 7 hours of duration.

It was possible to maintain good sensory acceptability of the dried tomato samples. However, the best rating scores for the sensory attributes such as colour, flavour, taste, mouth feel, appearance, overall acceptability were recorded as 4.93, 4.76, 4.4, 4.03, 4.35 and 4.30 respectively. Among all the samples, the best sensory acceptability was recorded for the sample dried at 70^0C for 7 hours of duration. Therefore, dried tomatoes with good physical and sensory properties could be obtained through oven drying at 70^0C at 7 hours of duration.

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Conflicts of interest
Authors showed no conflict of interest.

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