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Full Length Research

Effect of Drying Methods on Organoleptic Quality of Ginger (Zingiber Officinal) Tea

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Investigations were carried out on the effect of ginger tea prepared from ginger powder produced by different drying Method (sun, solar, and oven) on organoleptic quality. Organoleptic qualities of most dried products are affected by different drying methods because of responsible constituent instability under temperature. The study has an objective to assess the effect of different drying methods (sun, solar, and oven) on organoleptic quality of ginger tea. Samples of fresh mature ginger were bought from Hawassa local market and subjected to dry through the three drying methods. The tea was prepared from each Powder Produced by Different drying method sample and tested by Panellist through a well designed questioner. Results of the sensory evaluation indicated that there were a significant difference (P<0.05) between the drying methods on a quality parameter of (taste, appearance, colour and overall acceptance) Ginger tea. The Ginger tea prepared from solar dried ginger had the best overall acceptance.

Key words: Ginger officinal, oven, solar, sun

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INTTRODUCTION

Ginger is an herbaceous perennial plant known as Zingiber officinale, which belongs to the order, Scitamineae and the family, Zingiberaceae. It is a tropical herb extensively grown for its pungently aromatic underground stem or rhizome which is an important export crop valued for its powder, oil and oleoresin (NEPC, 1999).The rhizome is used as spice in culinary, beverage, confectionary, pharmaceutical and perfumery industries (Njoku, et al., 1995). Dry ginger contains 1-3% essential oil, 5-10% oleoresin, 50-55% starch and 7-12% moisture, with protein, fiber, fat and ash as its other constituents (Ebewele and Jimoh, 1981). Although a perennial plant, ginger is cultivated as an annual crop and propagated vegetatively by the cuttings of the fresh rhizomes (Sutherland, 1981).

Primary processing of freshly harvested ginger entails sorting, washing, soaking, splitting or peeling and drying it to a moisture content of 7-12% (Ebewele and Jimoh, 1981). The traditional drying methods used by society to dry ginger are unhygienically and Poor quality, due to using primitive practices which is inherited from ancient traditions that Cause:- varied, hazard and risky, resulting in mould growth, loss of some volatile oil by evaporation and destruction of some heat-sensitive pungent properties (Maigida and Kudi, 2000). This is the Result of little information and little or no Research on ginger drying for better quality and appearance of ginger. Therefore the research is expedient to make room for improvement on the traditional drying methods so as to improve the Organoleptic and quality of the dried ginger

on its Ginger Tea. This paper presents the results of a study conducted to examine the effects different drying methods on Ginger Tea organoleptic quality.

The output of this Research is important for society those having interest on ginger powder for spice consumption in the ginger tea making and spice purposes. Also to aware the best drying method without affect the acceptability of the organoleptic quality of ginger powder in ginger tea. So that people process ginger tea for spice purpose easily at home and commercial level.

The Objectives of this research are :- To know the effects of ginger powder produced by different drying methods (sun, solar and oven) on organoleptic quality of ginger tea, to prepare ginger tea from ginger powder produced from different drying methods and to identify the best drying methods in short time without affecting organoleptic quality of ginger tea.

MATERIALS AND METHODS

MATERIALS

The materials used for this thesis research project were; - The 6 kilogram of fresh ripe mature ginger (Zingiber officinal) was purchased from Hawassa local market in SNNPR., sugar, sun dryer solar dryer, oven dryer, slicer, cutter-mixer, sieve, cup, kettle, stove and sample trays. The rhizomes were washed to remove the adhering sand/mud. The rotten rhizomes were removed during the cleaning operation and peeled using peeler machine and the sticky central cores carved out using a sharp knife. The peeled ginger was washed again and sliced by slicer into 2mm and divided into three using weight 1.50 kg.

METHODS

Place of Experiment

The experiment was conducted in food science and technology laboratory at Hawassa University in main campus and agricultural campus. Hawassa University is situated at elevation of 1679metric above sea level and located in SNNPR of Ethiopia and lies 6.7^0Nand 38^o E latitude and longitude respectively. The annual average temperature ranges 13-32^oc and annual rain fall range 900-1100mm

Sample preparation

To evaluate the effect of ginger powder produced by different drying method on organoleptic quality of ginger tea, fresh ripe mature ginger were purchased from Hawassa local market in SNNPR. The rhizomes were washed to remove the adhering sand/mud, which loosens the mud, before washing under running water till the rhizomes were clean. The rotten rhizomes were removed once spotted during the cleaning operation and peeled using peeler machine the half longitudinally and the sticky central cores carved out using a sharp knife. The peeled ginger was washed again and sliced by slicer into 2mm and divided into three using weight 1.50 kg.

Drying

The prepared ginger samples were speared on tray to be dried in a solar dryer, oven dryer and on sunny place. Solar drying was carried out in solar dryer (average temperature of 35°C -40°C (95^oF-104 ^{o}F). Oven drying was done at 40°C (104^oF). Drying on the sun was done at average temperature of almost near to the solar dryer. The drying was done until constant weight was obtained in the three drying methods. After drying, the dried ginger samples were milled separately using cutter – mixer. After milling the powder was sieved by using 710µm sieve and packed in a transparent polypropylene sachet, sealed and kept at room temperature prior to ginger tea preparation

Ginger Tea preparation

For tea Preparation, 30g of ginger powder was weighed from each ginger powder (sun, solar and oven) dried ginger separately.800ml of tap water boiled at maximum temperature of the stove for 2minutes in three kettle, then the 60grm of sugar were added at the end and the ginger tea were sieved using tea sieve and added to tea cup for sensory evaluation.

Experimental design

RCBD (randomized complete block design) experimental design was used to investigate the effect of ginger powder produced by different drying methods on organoleptic quality of ginger tea and each sample was replicated three times.

Data collection

In order to identify the effects of ginger powder produced by different drying methods on organoleptic quality of ginger tea, sensory analysis was conducted to collect data. The parameters used for sensory evaluation were; - color, taste, flavor and over all acceptance. Sensory evaluation was taken place by using a 9 point hedonic

scale. The sensory analysis was carried out by 15 untrained panelists selected among students and Teacher of Food Science and post-harvest Technology, Hawassa University following standard procedures. Panelists were presented with replicated three samples (each for the three different treatments) and tap water for cleansing the palate.

Statistical data analysis

The statistical data analysis was done using SAS (2003) program (version 9.1).General to estimate the effect of drying Analysis of Variance (ANOVA) was used .Least significance difference (LSD) was used for mean separation between the treatments. The level of significance ($p<0.05$) was used in this study.

RESULTS AND DISCUSSION

RESULTS

From the Table 1, result shows that the effects of different drying methods (sun, solar and oven) on organoleptic quality of ginger tea. The result were significant at $p<0.05$ on the sensory acceptability comparing organoleptic quality of ginger tea. Sensory attributes were; Color, flavor, Taste and Overall acceptability. Values are means ± (SD) with n = 15. Means within same column with the same letters are not significantly different ($p < 0.05$).

DISCUSSION

Color Acceptability

Oven dried ginger tea had the lowest acceptability scores and was generally disliked ($p < 0.05$). Solar dried had higher acceptability than the two. It is clear from the results of Table1, that color acceptability ratings of the ginger tea decreased with increase in drying time although the oven and Sun were significantly different ($p < 0.05$). Drying at 40°C (104^{o}F). leads to loss of Yellow-orange carotenoid pigments responsible for color of the dried ginger. The color of oven dried ginger tea was not acceptable compared to sun dried ginger tea. This is probably because oven dried ginger was dried till uniform drying without removing and thus lost more of its yellow orange color. Color acceptability for oven dried ginger tea could be improved by minimizing drying time.

Flavor Acceptability

The flavor of the ginger tea prepared from oven and sun dried ginger was generally disliked and had significantly lower acceptability scores compared to solar dried ($p < 0.05$).This is due to loss of volatile compound and contamination which may leads to a decrease in flavor. High flavor acceptability scores for solar dried ginger tea could be attributed to the opposed as two cause. Therefore, it is important to control the drying duration and contamination for the purpose of enhancing flavor.

Taste Acceptability

Oven and sun dried ginger tea had the lowest acceptability and generally disliked ($p <0.05$). Solar dried ginger tea had comparable score which were significantly greater than those oven and sun dried ginger tea. It is important to note that taste may also influenced correlate with flavor. Therefore, enhancing flavor may also improve taste acceptability.

Overall Acceptability

From Table 1, results showed that overall acceptability of the ginger tea prepared from solar dried ginger was highest. The overall acceptability of oven dried ginger tea significantly different ($p< 0.05$) from solar died ginger tea. The results obtained are similar to those obtained for all the other sensory attributes rated. It is reported that the acceptability of ginger tea prepared from the above methods were influenced by their flavor. In this study, however, the ginger tea prepared from oven dried ginger had results of overall acceptability were significantly ($p< 0.05$) lower acceptability with all the sensory attributes tested. The color and flavor of ginger tea prepared from oven dried and sun dried ginger were positively related with overall acceptability. This shows that further studies will be needed on oven dried ginger tea to enhancing these attributes.

CONCLUSION AND RECOMMENDATION

On the basis of above discussion it can be concluded that the ginger tea prepared from sun, and oven dried ginger were significantly different ($p<0.05$) the overall acceptability compared to ginger tea prepared from solar dried tea. There were no significant differences in the flavor and taste between the ginger tea prepared from sun dried and oven dried of ginger powder. The ginger tea prepared from solar drying beneficial effects on the overall quality of the overall the two products. Although solar drying desired levels and had similar effects on all

Table1. Result of sensory evaluation results.

Treatments	Mean of color	Mean of flavor	Mean of taste	Mean of overall acceptability
Solar drying	8.044±0.928[a]	7.933±1.031[a]	7.600±1.303[a]	7.844±0.976[a]
Sun drying	6.244±1.653[b]	6.088±1.880[bb]	5.711±1.914[bb]	6.044±1.651[b]
Oven drying	5.422±1.852[c]	5.533±1.829[b]	5.622±1.736[b]	5.511±1.714[c]

acceptability when compared to oven and sun drying. Oven dried ginger tea was generally lowest sensorial acceptable then two method of drying. oven dried ginger tea was not acceptable because its long drying time continuously without removal till three days and high temperature encouraged greater loss of color pigments and aroma compounds as well as browning reactions. Although ginger drying under solar and oven drying method is not popular in Ethiopia, Although with small farm sizes coupled with abundant available labor, these operations have continued to depend on weather, drying spaces available in family compounds and labor to dry and packing the product, from time to time until it is sufficiently dried. However, where the production is large, labor is limited and weather is unfavorable, the use of the drying air would be more suitable. This research work was conceived to establish the best consumer acceptance method of drying ginger for purpose of ginger tea preparation. This research can contribute to the future scale-up of ginger tea production in the food industries. The fact that solar dried ginger tea produced in this study was acceptable then other two drying method suggests that such products could be adopted when introduced on the market. Therefore, further research work is recommended to improve the sensory quality and evaluate the nutrient retention in order to establish the suitability of drying in processing of ginger tea.

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APPENDIXS

Table 2. ANOVA of color

Source of variation	DF	SS	MS	F value	Pr> F
Treatment	2	161.881	80.941	53.03	<.0001
Panelists	14	129.081	9.220	6.04	<.0001
Error	118	180.119	1.526		
Corrected total	134	471.081			

Table 3. ANOVA for flavor

Source of variation	DF	SS	MS	F value	Pr> F
Treatment	2	142.059	71.030	34.67	<.0001
Panelists	14	107.926	7.709	3.76	<.0001
Error	118	241.719	2.049		
Corrected total	134	491.7037037			

Table 4. ANOVA of Taste

Source of variation	DF	SS	MS	F value	Pr> F
Treatment	2	112.311	56.156	28.30	<.0001
Panelists	14	134.489	9.606	4.84	<.0001
Error	118	234.133	1.984		
Corrected total	134	480.933			

Table 5. ANOVA of overall acceptability

Source of variation	DF	SS	MS	F value	Pr> F
treatment	2	134.533	67.266	43.79	<.0001
panelists	14	109.822	7.844	5.11	<.0001
Error	118	181.244	1.536		
Corrected total	134	425.600			