

Effect of Ripening on the Overall Quality of Orange Juice

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Abstract

The experiment was conducted at Mekele University, Department of Food Science and Postharvest Technology to evaluate the effect of ripening on the quality of the juice and to know the consumer acceptance of the different types of juices. To conduct the study, a total of 3 kg orange fruits which are uniform, undamaged and no symptom of infection was gathered, randomly grouped into 3 groups (4 oranges in each group) from orange trees to test the physico-chemical as well as juice quality. The first group (4 fruits) was analyzed while it is unripe. Whereas the second and third group was allowed to ripen under room temperature of 25 to 30 °C then analyzed when it is half-ripe, fully-ripe respectively. The sensory evaluation was carried out on the juice using 5 trained panelists who frequently use orange juice. Sensory attributes was assessed using appearance, taste, mouth feel and overall acceptability. A hedonic scale of 1-5 (5= likes very much, 4=slightly very much, 3=neither like nor dislike, 2=dislike slightly and 1=dislike very much) was used as assessment criteria. The study concludes that the stage of ripening of orange has nutritional as well as sensory implications on juice produced from it. Accordingly, full-ripe orange is preferred for producing good quality orange juice and better acceptability of by customers than juice prepared from un-ripped and partially ripped orange. Overall, the study recommends that orange fruit should be collected once fully ripe, but extra delay in the field or storage may lead to deterioration in quality due to over-ripening as well as attack by birds, insects. Such condition leads to produce with less acceptance even health risk to costumers.

Keywords: ripe, orange juice, sensory quality

1. INTRODUCTION

Orange juice is the liquid extract of the fruit of the orange made by squeezing the fresh orange, drying and later re-hydrating the juice, or concentration of the juice and later adding water to the concentrate. It is known for its health benefits, particularly its high concentration of vitamin C (www.wikipedia.org).

Common orange juice is made from the sweet orange, but different cultivars (e.g., Valencia, Hamlin) have different properties, and a producer may mix cultivar juices to get a desired taste. Orange juice usually varies between shades of orange and yellow, although some ruby red or blood orange varieties are a reddish-orange or even pinkish. This is due to different pigmentation in ruby red oranges. Blood orange juice is popular in Italy, but may be hard to find elsewhere. The andarin orange and varieties clementine and tangerine, are good for juice, and are often used for sparkling juice drinks. Orange trees were found to be the most cultivated fruit tree in the world. Orange trees are widely grown in tropical and subtropical climates for their sweet fruit. The fruit of the orange tree can be eaten fresh, or processed for its juice or fragrant peel. As of 2012, sweet oranges accounted for approximately 70% of citrus production (<http://www.sun-gazing.com>).

In our country there is very low amount of orange consumption in the form of juice due to the loss of its quality parameter's, such as flavor, aroma, consistency and others. This is mainly as a result of different factors starting from the fruit in which it is harvested up to the processing stage. Among the factors that reduces the consumption of orange juice is ripening stage. Therefore this study was conducted to study the problem and to find out the possible solution. Even though the study area is rich in fruits especially orange but little research has done about the effect of ripening on juice quality. This study was considered to give enough information and awareness for users about the implementation and utilization of different orange juices and also have significant role in generation of additional income furthermore, this study is used as a reference for a researchers.

Hence, the objective of this study was to evaluate the effect of ripening of orange on the quality of the juice and consumer acceptance of juices prepared from different degree of ripeness.

2. MATERIALS AND METHODS

2.1. Description of the study area

The experiment was conducted at Mekele University, Department of Food Science and Postharvest Technology which is found in regional state of Tigray. It is located in around 780 kilometers north of Addis Ababa, at 13°29N latitude, 39°28E longitude, with an elevation of 2084 meters above sea level.

2.2. Sample size and procedure

The Oranges used for this study was collected from private orange farm at around Mekelle town and transported to the laboratory of the Department of Food Science and Postharvest Technology, Mekelle University for analysis. A total of 3 kg orange fruits which are uniform, undamaged and no symptom of infection was gathered,

randomly grouped into 3 groups (4 oranges in each group) from orange trees to test the physico-chemical as well as juice quality. The first group (4 fruits) was analyzed while it is unripe. Whereas the second and third group was allowed to ripen under room temperature of 25 to 30 °C and analyzed when it is half-ripe, fully-ripe respectively. The degree of ripens was determined according to Mamiro et al. (2007) i.e fruits was considered unripe when firm with no depression when thumb-pressed. Fully ripe fruits show strong perfume, and indented upon pressing with the thumb while half-ripe indented slightly (Appiah et al., 2011).

2.3. Sensory Evaluation

Sensory evaluation was carried out on the juice using 5 trained panelists who frequently use orange juice. Sensory attributes was assessed using appearance, taste, mouth feel and overall acceptability. A hedonic scale of 1-5 (5= likes very much,4=slightly very much,3=neither like nor dislike,2=dislike slightly and1=dislike very much) was used as assessment criteria (Ihekoronye et al., 1985).

2.4. Data Analysis

The data which gathered through observation, informal discussion with orange farm owners, sensory and laboratory results was coded, analyzed and presented in the form of table, %, and figure.

4. RESULT

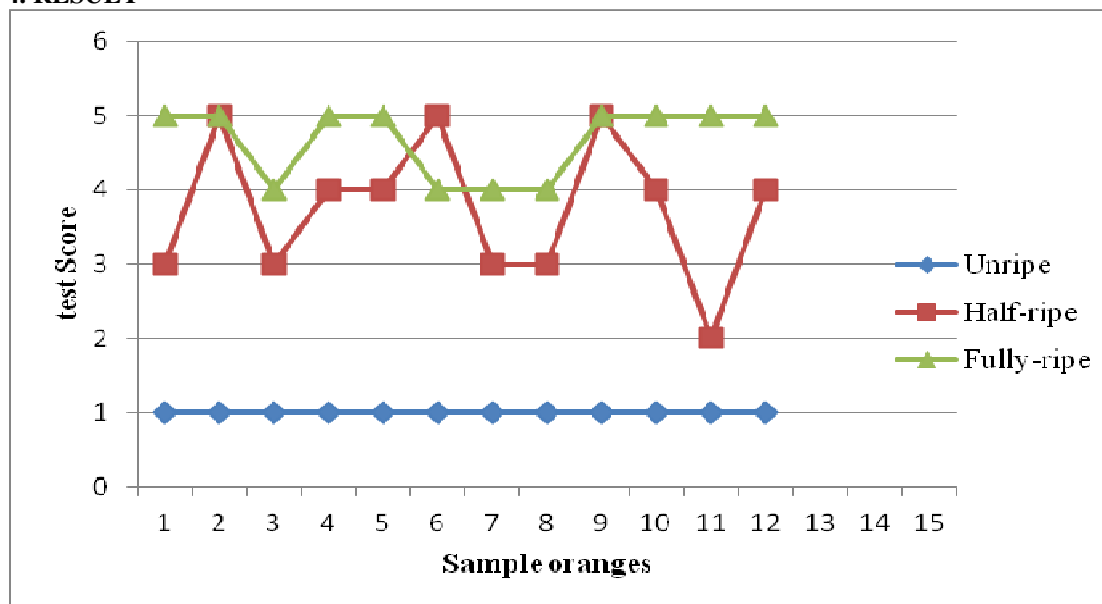


Figure 1, test score for Orange juice by the sensory panel where 5= likes very much,4=slightly very much,3=neither like nor dislike,2=dislike slightly and1=dislike very much

Table 2. Mean of sensory parameters identified by trained panelist

Stage of Fruit Maturity	Test	Appearance	Mouthfeel	Overall Acceptability
Unripe	1	2.52	1.27	1.59
Half-ripe	3.75	3.47	3.8	3.66
Fully-ripe	4.66	4.59	4.73	4.68

Where (5= like very much,4=slightly very much,3=neither like nor dislike,2=dislike slightly,1=dislike very much)

5. DISCUSSION

As illustrated above in Table 2 and Figure 1; this table shows that the juices from the 3 types of orange has different customer acceptance as a result of variation on their composition change during ripening seasons. Several major changes take place as fruits ripen, and taken collectively they characterize ripening processes. They include changes in carbohydrate composition; resulting in sugar accumulation and increased sweetness, change in color, flesh softening and textural change, formation of aroma volatiles and accumulation of organic acids with associated development of flavor. The taste of the juice was significantly affected by the stage of ripening of the fruits. Accordingly, juice produced from fully-ripe Orange fruits was preferred (4.66) compared to both the unripe (1) and half-ripe (3.75).

The appearance of the juice produced from oranges at different stages of ripening differed significantly from each other. Juice produced from full-ripe orange fruits were the most preferred (4.59) as compared to those

from the half-ripe (3.47) and unripe (2.52) mangoes. The present study agrees with the finding of Francis et al. (2011). The results of the study also indicated that juice produced using full-ripe Orange gave the most preferred mouthfeel with a score of 4.73. This was followed by half-ripe (3.8). The juice from the unripe orange was the least preferred (1.27).

From the study, it could be speculated that the taste of orange juice was closely related to their sweetness and acidity as has been reported (Kader, 2008). Taste improved with increasing sweetness and decreasing acidity. This explains why the ripe chips were preferred. Acids are known to be responsible for the taste in most fruits with low PH. As starch in fruits is transformed into sugars during ripening, the taste becomes sweet due to increased sugar levels contributing to the taste of the fruit. The panelists however, did not like the taste of juice made from the unripe fruits due to their sourness (acidic). Juice prepared from full-ripe orange fruits scored highest for appearance (1.37) as compared to those from the unripe (2.61) and half-ripe mangoes (2.33). During ripening, the intensity of yellowing increased in the orange fruit. There were differences observed in the appearance between the different chips produced from the green-mature, half-ripe and full-ripe mango fruits.

Mouthfeel is an indicator of the sensation of food in the mouth. The results of the study indicated that juice produced using full-ripe mangoes gave the most preferred mouth feel. This was followed by half-ripe with unripe being the least preferred. This might be due to the total soluble solids content and acidity which are important quality parameters that influenced the perception of mouth feel by the sensory panel. Similarly a study by Appiah et al. (2011) revealed that preference for the mouth sensation given by the full-ripe chips could be attributed to their high sugar content and titratable acidity since total soluble solids correlated positively to mouthfeel and inversely to titratable acidity.

The panelists generally preferred juice produced from the full-ripe Orange fruits to those made from the mature-green or half-ripe orange. This was due to higher total soluble sugar content and lower acidity. Furthermore, the mean scores for overall acceptability of juice indicates that there were significant differences among the different degrees of ripeness which are 1.59, 3.66 and 4.68 for unripe, half-ripe and full-ripe respectively.

6. CONCLUSION

The study concludes that the stage of ripening of Orange has nutritional as well as sensory implications on juice produced from it. Accordingly, the results of this study have shown that full-ripe orange is preferred for producing good quality orange juice and that taste is an important quality indicator for the acceptability of orange juice. Overall, the study recommends that orange fruit should be collected once fully ripe, but extra delay in the field or storage may lead to deterioration in quality due to over-ripening as well as attack by birds, insects. Such conditions lead to produce with less acceptance even health risk to consumers. The juice house, cafeteria should also use properly ripe orange with no damage to prepare good quality juice.

7. References

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