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SENSORY ATTRIBUTES OF THE CRUSH MADE FROM POMEGRANATE AND GUAVA

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ABSTRACT

Sensory attributes of the crush prepared from pomegranate juice and guava pulp was evaluated. The fruit juice of pomegranate and pulp of guava was incorporated for the preparation of the crush at different levels, where, T_1 (15% pomegranate juice and 10% guava pulp), T_2 (17.5% pomegranate juice and 7.5% guava pulp), T_3 (18.75% pomegranate juice and 6.25% guava pulp), T_4 (20% pomegranate juice and 5% guava pulp) and the remaining 75% was the sugar syrup. Good quality crush can be prepared by blending 18.75% pomegranate juice and 6.25% guava pulp (T_3) which has a unique taste. Pomegranate and guava have good medicinal as well as nutritional properties like anticancer, improvement of digestive system, decrease lipid per oxidation, enhance biological action of nitric oxide, decrease inflammation, decrease angiotensin covering enzyme activity, decreased systolic blood pressure, analgesic, anti-bacterial, anti candidal, anti dysenteric, anti ulcerous, hypertensive, etc. It is seen that the organoleptic score of the crush prepared by blending 18.75% pomegranate juice and 6.25% guava pulp (T_3) was highest, i.e. 9.2 followed by the treatment T_4, T_2, T_1.

Keywords: Crush, Guava, Pomegranate, Blending.

INTRODUCTION

Fruit crush are having good digestible and appetizing properties and are known for medicinal and therapeutic value, which have a profound effect on human health. The fruits and vegetables abundant during various season, much of which is lost because of wastage due to detoriation under tropical condition due to high temperature, humidity, pest and disease infestation, poor handling and improper storage facilities (Pantastico, 1975). Therefore, processing of fruits and vegetables to valuable products are the ways abundant fruits can be utilized reduce wastage and bring good economic return to farmer (Dauda, 2013). Blending of two or more fruit juices for the preparation of crush may be convenient alternative for developing a new innovative product.

Crush has higher nutritional, therapeutic and calorific values as compared to other carbonated beverages available in market.Crush is a beverage which contain 25% pulp, TSS not more than 55^0Brix and less than 3.5% acidity.

The Pomegranate (*Punica granatum*) is an ancient fruit which belongs to the family *Punicaceae* and has been widely consumed over 1000 of years (Longtin, 2013). Pomegranate plant is more or less spiny and deciduous, with small, narrow, oblong leaves with short stem. In orchards, plants are normally trained to a single trunk forming a large shrub or small tree, and reaching a height of 12 to 20 feet at maturity (Morton 1987). Pomegranate flowers are red to red orange funnel shaped and heterostylous (Martinaz et al, 2000). Pomegranate fruit is berry like with a leathery rind (or husk) enclosing many seeds surrounded by juicy arils, which comprise the edible portion of the fruit (Watson and Dallwitz, 1992). Number of locules and arils varies, but may be as high as 1300 per fruit (Levin, 2006). Fruit ripens in about 5-6 months after flowering and are harvested when colour becomes more dark and then used for further processing.

Pomegranate is mostly native to the Iranian plateau and Himalayas in Northern India. The edible part of fruit contains acids, sugars, vitamins, polysaccharides, polyphenols and minerals; however, several factors may contribute to chemical changes (Maria et al, 2010). Edible part of Pomegranate fruit is 50% and consists of 40% arils and 10% seeds. Arils contain 85% water, 10% total sugar, mainly fructose and glucose and 1.5% pectin, organic acid such as ascorbic acid, citric acid and mallic acid and bioactive compound such as phenolic and flavanoids, principally anthocynins (Aviram ,2000; Tezcan, 2009).
The seeds are rich source of total lipid; Pomegranate seed oil comprises 12% to 20% of total seed weight. The oil is characterized by a high content of poly unsaturated (n-3) fatty acids such as linolenic , linolenic and other lipids such as punicic acid,oleic acid, stearic acid and palmitic acid (Ozgul- Yucel, 2005 and Fadavi*et al*, 2006).The seeds also contain protein, crude fibers, vitamins,minerals, pectins, sugars, polyphenols, isoflavones (mainly

genistein). The phytoestrogen coumerol and the sex steroid, estrone (El- Nemr*et al*, 2006, Syed *et al*, 2007). Natural polyphenols in Pomegranate fruit range from simple molecule (phenolic acid, phynilpropanoids, flavanoids) to highly polymerised compound (lignin, melanin and tannin),with flavanoids representing most common and widely distributed sub group (Soobrattee*et al*,2005).

Anthocynins are the largest and most important group of flavanoids presenting Pomegranate arils which are use to obtain the juice. This pigment gives the fruit red colour. Pomegranate peel is rich in hydrolysable tannin, mainly punicalin, pedunculagin and punicalagin (Seeram, 2005). Due to pH anthocynins are largely transformed in to non- red forms or degraded (97%), similar results are obtained for vitamin C (Perez- Vicente, 2002). The most therapeutically beneficial Pomegranate constituents are ellagic acid, ellagitannins, punicic acid, flavanoids, anthocynidins, anthocynins and estrogenic flavonols and flavons. Ellagic acid exhibits powerful anti carcinogenic and anti oxidant activity.

Table 1: Chemical composition of Pomegranate fruit (Chavan*et al*, 1995)

Constituent	Edible fruits	
	Fresh	Dry weight basis
Moisture (%)	78	19
Protein (%)	1.6	7.27
Total sugar (%)	14.6	66.36
Ascorbic acid (mg/1000 gm)	16.0	72.73
Ash (%)	0.7	3.18
Acidity (%)	0.58	2.64
Minerals (mg/1000 gm)		
Calcium	10	45
Phosphorus	70	318
Magnesium	44	200
Potassium	133	604
Sodium	0.90	4.09
Iron	1.79	8.14
Zinc	0.82	3.73
Manganese	0.77	3.50
Copper	0.34	1.55

Pomegranate juices also have many therapeutic effects on the body. The principle mechanism of action of Pomegranate juice is antiatherogenic and may include the following: Increase serum anti oxidant capacity, decrease lipid per oxidation, enhance biological action of nitric oxide, decrease inflammation, decrease angiotensin covering enzyme activity, decreased systolic blood pressure, their by causing an overall favourable effect on the peroration of arthrosclerosis and the subsequent potential development of choronary heart diseases (Basu and Penugonda, 2009). Pomegranate juice may prevent diabetic sequelae via peraxixome proliferator- activated receptor- gamma binding and nitric acid production. Pomegranate compound associated with anti diabetic effect include oleanolic, ursolic, gallicacid (Katz, 2007). Pomegranate derived products may be useful agains UVB-induced damage to human skin (Afaq, 2009). Pomegranate juice consumption led to an increase in epididymal sperm concentration, sperm motility, spermatogenic cell density and the diameter of seminiferous tubules and germinal cell layer thickness, it also decreased the abnormal sperm rate when compared to the control group (Turks *et al*, 2008). Pomegranate possesses best antioxidant activity and is suitable for food processing in which thermal devices are used, because of their heat resistant (Elfalleh *et al*, 2009) and (Devatkal *et al*, 2010).

Pomegranate juice had the greatest anti oxidant potency, composite index among beverages like black cherry juice, cranberry juice, grape juice, apple juice, orange juice, blueberry juice, red wine and ice tea; and the anti oxidant activity was atleast 20% superior toany other beverages tasted (Seeram *et al*, 2008; Kalewala *et al*,2004, Schafer *et al*, 2006). Consumption of Pomegranate product leads to significant accumulation of elligitannins in the large intestine, where they interact with complex gut microflora (Bialonskas et al 2009). In *Aurveda*, Pomegranate is considered "A pharmacy unto itself" and is used as an anti parasitic agent, blood tonic and to heal aphthae (Jurenka, 2008).

Guava belonging to family *Myrtaceae* is a traditionally used plant because of its nutritional and food value. Guava is widely grown in tropical and many areas like India, Bangladesh, Florida and West Indies. Guava is a small tropical tree that grows upto 35 feet tall having immense medicinal important. The Guava fruit is rich in Vitamin C, Vitamin A, Iron, Calcium and Phosphorus. Guava is 5 times richer in Vitamin C than oranges. Phosphoric Oxalic, Malic acid and Manganese are also present this fruit. Ascorbic acid mainly found in fruit skin varies from 56 – 600 mg and may range to 350 – 450 mg in nearly ripen fruit. Canning and other heat processing destroy about 50% of ascorbic acid. The strong odour of fruit is attributed to carbonyl compound (Kumar, 2012).

Table 2: Chemical composition of Guava fruit (Kamanth *et al*, 2008)

Constituent	Availability
Calories	77-86 gm
Moisture	2.8 – 5.5 gm
Crude fibre	0.9 – 1.0 gm
Protein	0.1 – 0.5gm
Fat	0.43 – 0.7gm
Ash	9.5 – 10 %
Carbohydrates	9.1 – 17 mg
Calcium	17.8 – 30 mg
Phosphorous	0.30 – 0.70 mg
Iron	200-400 I.U.
Carotene (Vitamin A)	0.046 mg
Thiamin	0.03 – 0.04 mg
Riboflavin	0.6 – 1.068 mg
Niacin	40 I.U.
Vitamin B3	35 I.U.
Vitamin G4	36 – 50 mg
Vitamin C	228 mg

Fruits are recommended for gout. The Guava has properties like analgesic, anti bacterial, anti candidal, anti dysenteric, anti ulcerous, hypertensive, etc. About 16 types of carotenoids have been reported in the flesh part of red Guava, and 13 of them have been reported as Guava carotenoids which are responsible for anti oxidant activity (Mercadante *et al*, 1999). The pulp and peel of the Guava are a remarkable source of anti oxidant dietary fibre. Guava fruits are also good source of pectin – a dietary fibre (Kaljee *et al*, 2004). Guava fruit extract has been shown to significantly restore a loss of body weight and reduces the blood glucose level in the diabetic condition. Guava contains phenolic phytochemicals which inhibit per oxidation reaction in the living body and thus prevent various types of chronic diseases such as diabetic, Cancer and Heart diseases (Kimura *et al*, 1985).

METHODOLOGY

Table 3: Treatments

Sr. No.	Pomegranate juice (%)	Guava pulp (%)
T_1	15	10
T_2	17.5	7.5
T_3	18.75	6.25
T_4	20	5

(25% Pomegranate juice + Guava pulp and 75% is sugar syrup in all cases.)

The different treatments of Guava and Pomegranate juice where prepared and put forward for the next step of the study of sensory evaluation for identifying the best acceptable product.

EXTRACTION OF POMEGRANATE JUICE

Collect fresh and mature Pomegranate fruits (free from infections)
↓
Wash with fresh water
Removal of rind
↓
Separation of arils
↓
Extraction of juice by pressing
↓
Separation of seeds
↓
Straining through muslin cloth
↓
Collect the fresh juice

EXTRACTION OF GUAVA PULP

Selection of ripe Guava
↓
Wash with fresh water
↓
Remove undesirable part
↓
Cut into small pieces
↓
Crushing the fruits
↓
Pass through the stainless sieve
↓
Separation of seed
↓
Storage of pulp

PREPARATION OF CRUSH (FPO, 1955)

Blending of Pomegranate juice and Guava juice
At various level like T_1, T_2, T_3 and T_4
↓
Make sugar syrup
(Add 51.25 gm sugar in 22.95 ml water and 0.8 gm citric acid)
↓
Add above syrup in 25 ml blend
↓
Heat till desired Brix is achieved
↓
Bottling
↓
Pasteurization
↓
Cooling
↓
Storage

RESULT AND DISCUSSION

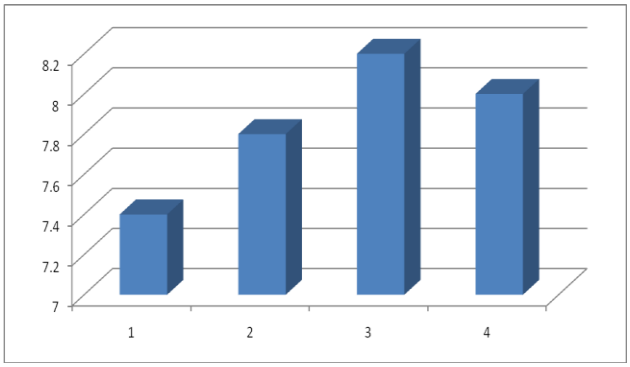
The experimentalPomegranateGuava crush was sensory evaluated by a panel of 15 members on a nine point hedonic scale and marking was done on the basis of five paprameters.

1. Colour
2. Clarity
3. Taste and flavour
4. Consistency
5. Overall acceptability

The total average and standard deviation of individual product was calculated and the best acceptable product was put forth for the next phase.

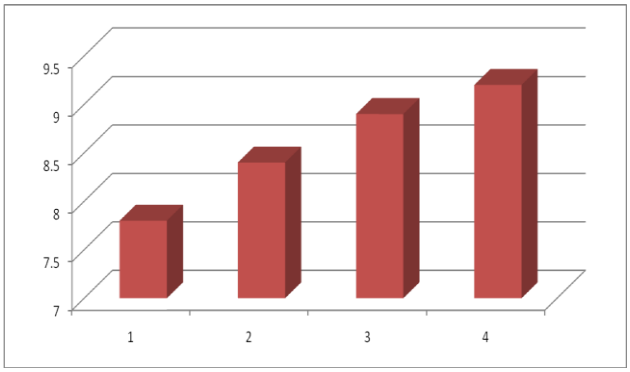
Treatments	Colour	Clarity	Flavour	Consistency	Overall Acceptability
T_1	7.4	7.8	7.6	7.2	6.8
T_2	7.8	8.4	7.8	7.5	7.4
T_3	8.2	8.9	9.4	8.6	9.2
T_4	8.0	9.2	8.0	8.2	8.2

COLOUR



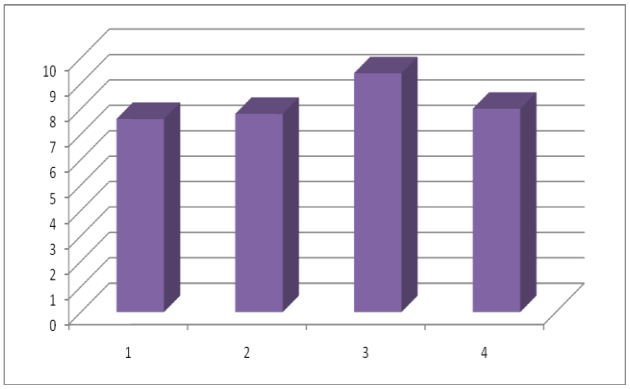
The average score for colour is highest for T_3, i.e. 8.2 out of 10 which is maximum and T_1 is 7.4 which is lowest among all the samples. The colour of the crush changes due to the change in concentration of the Pomegranate juice which is highest for T_3 and lowest for T_1.

CLARITY



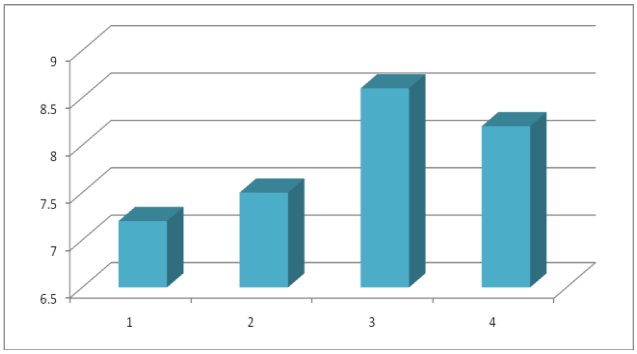
The average score for clarity for T_4 is 9.2, which is maximum and the least score is for T_1 which is 7.8, the clarity is highly affected by the concentration of Guava pulp. The concentration of Guava pulp in T_4 is low.

FLAVOUR



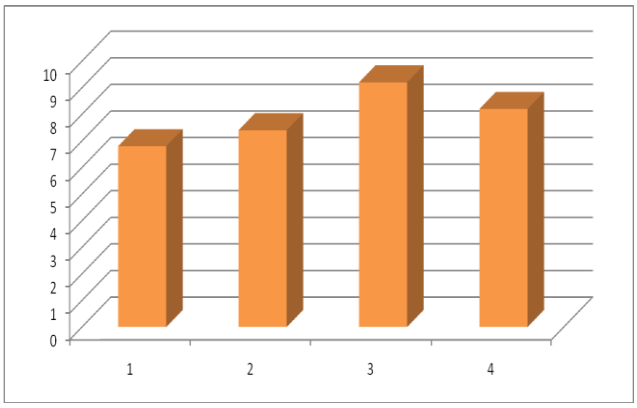
The average score for flavour for T_3 is 9.4 which is maximum and for T_1 is minimum, i.e., 7.6. This may be due to the changing concentration of the blend. T_1 contains more amount of Guava and less amount of Pomegranate juice and T_4 contains more amount of Pomegranate juice and less amount of Guava pulp, thus making it unacceptable. But T_3 contains optimum amount of both juices thus making it more acceptable.

CONSISTENCY



The average score for consistency for T_3 is 8.6 which is maximum and the least score for the T_1 is 7.2. The consistency is highly affected by the concentration of Guava pulp.

OVERALL ACCEPTABILITY



The overall acceptability of the product is judged on the basis of the above mentioned parameters; maximum average score is 9.2 by the sample T_3 . After statistical analysis it was found that there was a significant relation between the different parameters. Same finding where predicted by Shukla *et al*, 2015. The above results suggest that the crush formulated from the blend of Pomegranate and Guava pulp (T_3) is more acceptable than T_1, $T_2$and T_4.

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