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Juice Blending: A Way of Improving Microbial, Sensory, and Physicochemical Properties of Pummelo (Citrus Grandis L. Osbeck) Juice at Refrigerated and Ambient Storage Conditions

Vijaykumar T. Kore* and I. Chakraborty
Dept. of Post Harvest Technology of Horticultural Crops,
Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Dist. Nadia, West Bengal- 741252, India
Corresponding Author: Vijaykumar T. Kore
Current Address for Correspondence: College of Agriculture, Mul-Maroda, Distt. Chandrapur, Maharashtra, India

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ABSTRACT: Different fruit juice blends were prepared as pummelo: pineapple (50:50), pummelo: pineapple (60:40), pummelo: pineapple (40:60), pummelo: pineapple: beetroot (36:60:4), pummelo: sugarcane (40:60), pummelo: sugarcane: ginger, (58:40:2) and control (100:0:0). The microbial, physico-chemical, and sensory parameters of blended drinks were evaluated for eight months at 30 days interval at refrigerated and room temperature. It was observed that the juice blend of pummelo: pineapple (50:50) was most effective blend for higher values of total sugar, reducing sugar and ascorbic acid at both temperatures. However, the TSS content was highest in control (100:0:0) while acid content was highest in pummelo: pineapple: beetroot blend (36:60:4) at both storage conditions. Regarding sensory attributes, maximum score for overall acceptability was observed in blending of pummelo: pineapple (50:50). The blending of pummelo: sugarcane: ginger (58:40:2) was best of minimum population of yeast and bacteria at refrigerated and room temperature respectively at end of the storage.

KEYWORDS: Citrus grandis L. Osbeck, juice blending, physico-chemical properties, organoleptic taste, microbial population, storage conditions.

I. INTRODUCTION

Beverages are considered to be an excellent medium for the supplementation of nutraceutical components for enrichment [1] such as soluble fibre or herbal extract [2]. The functional beverages not only provide taste and refreshment satisfaction, but can also provide necessary nutrients to prevent nutrition-related diseases [3]. One of the most frequently utilized fruit production technologies is juice processing. Juices are much appreciated for their nutritive value, and modern technologies along with Good Manufacturing Practice (GMP) allow the production of juices that closely emulate the raw fruit from which they are derived [4].

Pummelo (Citrus grandis L. Osbeck) is referred to a type of giant citrus fruit and parent of many citrus fruits such as grapefruits and tangelos native to southern Asia and Malaysia belongs to family Rutaceae. It is thought to be the ancestor of the grape fruit. Fruit is having very thick skin with always round shape and big size but soft and easy to peel away [5]. Pummelo is commonly consumed as fresh fruit. Various processed products can be prepared from fruit like jams, jellies, marmalades and syrups. The juicy pulp of pummelo is either eaten raw or used for juice extraction [6].

Excessive bitter taste in citrus juice is another major problem in citrus industry worldwide because it reduces the quality and commercial value of the product [7]. The processing of citrus juice faced formidable problems in terms of “bitterness” and “delayed bitterness”, thereby affecting its consumer acceptability. Without proper de-bittering technology the profitable citrus industry cannot flourish [8]. For improving the sensory properties, nutritive value and reducing bitterness, pummelo juice was blended with some other highly nutritive fruit juices namely pineapple, sugarcane, beetroot and with spice extracts like ginger. All these fruits are having their own importance in terms of nutritional, medicinal properties and ginger juice also have antibacterial and anti-fungal properties.

Many authors [9]; [10]; [11] and [12] have reported that two or more fruit juice/pulp may be blended in various proportions for the preparation of nectar, RTS beverages etc. The blending of juice

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may also improve aroma, taste and nutrients of the beverages.

The above said blended drinks are not available commercially in the market and research has not been carried out on preservation of such blended drink. Research on preservation and storage studies were mostly confined to other fruit juices. In present study various types of blended drinks were developed and evaluated for storage statistically to provide more nutritive drinks to the consumers.

II. MATERIALS AND METHODS

2.1 Plant materials. The experiment was performed over various local cultivars of pummelo during the years 2010-2012 at laboratory of Post Harvest Technology of Horticultural Crops, Directorate of Research Building, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, India. Fruits collected from the different villages like, Kalyani, Madanpur, Mohanpur, Kataltala, Chasrathi, Allaipur, Birpara, Iswaripur and Natunpulli etc from Nadia District. All fruits were harvested by hand at well developed and mature stage and immediately brought to the laboratory for further investigation. Maximum efforts were made to select the fruits that were uniform in size, good in quality and free from injury or disease.

2.2 Juice preparations. Fruits were washed with clean running water to remove dust particles and to reduce the microbial load on the surface of the fruits. Peeled pummelo and pineapple fruits were crushed in juicer for extraction of juice. Beetroot were peeled with the help of stainless steel knives and cut into pieces. These cut pieces were passed through the juicer for extraction of juice. Ginger were sliced with the help of stainless steel knives and crushed with mixer cum juicer for the extraction of juice. Sugarcane juice was prepared by sugarcane juice extractor.

2.3 Blending. In processing of pummelo blended nectar, various types of juices were used for improving their overall quality. Blending of juices was done with the addition of pineapple juice, sugarcane juice, ginger juice, beetroot juice in pummelo juice with their respective blends to improve the overall quality of the processed products. Different blending treatments are given in Table 1.

2.4 Preparation of blended nectar. Blending was done of their respective blends following the standard procedure. The drink was prepared by adding hot water, sugar, and citric acid. All the ingredients were dissolved through homogenizer. Drinks were heated below boiling point for a few minutes and sodium benzoate was added into it. The drinks were filled in pre-sterilized 200 ml capacity glass bottles at 85^{o}C, sealed and stored at refrigerated and ambient temperature.

2.5 Storage studies. Pummelo nectar beverage was subjected to storage studies at refrigerated (10 ± 1^{o}C) and room temperature (26.8 ± 4^{o}C) for a period of 8 months by drawing samples at monthly intervals to evaluate changes in physico-chemical, microbial and organoleptic parameters.

2.6 Laboratory analysis. The physico-chemical parameters including Total Soluble Solids (TSS) of the fruit juice was determined by Hand Juice Brix Refractometer (Erma, Japan), values corrected to 20°C and expressed as °Brix. Acidity (as citric acid) was determined by using standard N/10 NaOH solution in the presence of phenolphthalein as an indicator, [13]. The vitamin 'C' (ascorbic acid) content of the juice was estimated by visual titration method with 2, 6-dichlorophenol-indonenol dye solution [13]. Total sugars content of fruit was estimated following the method of Lane and Eynon as described by [14] using Fehling's solution A and B and Methylene blue as an indicator. Microbiological study was carried out by a series of dilution and spread plate method [15] . In order to find out the consumer preference juice blend ratio on the organoleptic evaluation viz., colour, flavour, taste and overall acceptability of juice was done by a panel of ten semi-trained judges using 9 point hedonic scale [16] .

2.7 Statistical Analysis. All estimations were carried out in triplicate, determinations were made for each attribute and data pertaining to the physico-chemical, sensory quality and microbial population were statistically analyzed by using completely randomized design. The data were analyzed by analysis of variance (ANOVA) and means were compared by Duncan's Multiple Range Test by using SAS Version 9.1 for windows, 2002-2003, SAS Institute Inc., Cary, NC, USA. Differences between the means at the 5% level were considered significant.

III. RESULTS AND DISCUSSION

3.1 Effect on physico-chemical properties

3.1.1 Initial bio-chemical values. The reading for highest and lowest physico-chemical parameters (Table 2) of blended pummelo nectar was observed for TSS content in T_3 (15.40^{o}Brix) and T_4 (14.60^{o}Brix) whereas total sugar observed in T_1 (5.41%) and T_7 (2.24%) with reducing sugar was observed in T_1 (2.81%) and T_7 (2.19%), pH 3.75

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(T_1) and 2.95 (T_7) with a titratable acidity in T_7 (1.28%) and T_4 (0.57%) whereas ascorbic acid observed in T_1 (78.60 mg/100ml) and T_7 (48.25 mg/100ml). The bacterial and yeast population of blended nectar was 0.00 in all the treatments.

3.1.2 Total Soluble Solids. The TSS of litchi blended squash showed increasing trend during storage at refrigerated and ambient temperature up to 8 months (Table 3). The TSS content of T_7 (17.40^{o}Brix) was significantly higher than T_1 (17.13^{o}Brix) followed by T_3 (17.00^{o}Brix) on 8th month of storage. The same result was observed in ambient temperature, where T_7 had maximum TSS content (17.50^{o}Brix) significantly higher than rest of the treatments, while lowest amount of TSS was found in T_4 (16.36^{o}Brix) on 8th month of storage. The rate of increase was more at ambient temperature as compared to refrigerated temperature upto 8 months.

3.1.3 Total sugar. It was observed that the total sugar content of pummelo nectar was shown gradually increasing trend with increasing the storage duration upto 8 months in both the storage conditions (Table 4). The rate of increase was more at ambient temperature as compared to refrigerated temperature upto 8 months. Total sugar content was significantly higher in T_1 (12.04%) followed by T_3 (11.31%) on 8th month of storage at refrigerated and T_1 (13.02%) followed by T_3 (12.28%) at ambient temperature while total sugar content of control (T_7) was significantly lower (8.76 and 8.19% respectively) than other treatments at both storage conditions.

3.1.4 Reducing sugar. Like TSS and total sugar, reducing sugar content of pummelo nectar also showed increasing trend during storage at both refrigerated and ambient temperatures upto 8 months of storage period (Table 5). In both the storage conditions, reducing sugar content of T_1 (6.89% and 11.13%) was significantly higher than T_3 (5.53% and 10.10%) followed by T_2 (5.20% and 8.84%) at refrigerated and ambient temperature respectively while control (T_7) had lowest reducing sugar content (4.16% and 5.33%) at both temperature respectively on 8th month of storage. Like TSS and total sugar, reducing sugar also showed increasing trend more in ambient temperature than refrigerated temperature upto 8 months of storage.

3.1.5 Ascorbic acid. Ascorbic acid content of pummelo nectar showed reverse trend upto 8 months of storage at refrigerated and ambient storage, i.e. the ascorbic acid content gradually decreased with increased in storage duration (Table 6). From the table it was revealed that, the ascorbic acid content of T_1 (25.20 and 25.78 mg/100ml) was significantly higher than the rest of the treatments i.e. T_3 (22.35% and 18.35 mg/100ml) and T_2 (16.66 and 18.25 mg/100ml) on 8th month of storage at refrigerated and ambient temperature respectively while lowest amount of ascorbic acid content was observed in T_7 (12.50 and 11.30 mg/100ml respectively). The rate of decrease of ascorbic acid in ambient temperature was rapid as compared to refrigerated storage condition.

3.1.6 Acidity. Like ascorbic acid, the acid content of pummelo nectar also decreased with increased in the storage duration (Table 7). From the table it is revealed that T_4 contains highest acidity (0.28%) followed by T_7 (0.21%) and T_3 (0.16%) while T_1 treatment had lowest acid content i.e. 0.10% on 8th month of storage at refrigerated storage. Same condition was also observed in ambient temperature storage where the acid content of T_4 (0.64%) was significantly higher than rest of the treatments. The lowest amount of acid content was observed in T_1 (0.26%). In refrigerated storage, the value of acidity was rapidly decreased than ambient temperature storage.

3.2 Sensory properties. The organoleptic quality of pummelo nectar was assessed by consumer's acceptability test and was evaluated at monthly intervals upto 8 months of storage at refrigerated and ambient temperature (Table 8). All the sensory parameters of the blended juices were found to be superior as compared to juices prepared from individual fruit except colour. The blend of pummelo juice (50%) + pineapple juice (50%) recorded higher score for aroma and taste (7.87, 7.81 and 8.12, 7.25) was significantly higher than other blends at refrigerated and ambient temperature respectively. However, control (T_7) had significantly higher score for colour (7.93 and 8.56) and was statistically at par with T_1 and T_3 at refrigerated temperature and ambient temperature respectively. Maximum overall acceptability score was found in T_1 (7.81 and 7.91) followed by T_3 (7.25 and 7.72) at refrigerated and ambient temperature respectively, while minimum overall acceptability score was found in T_7 (4.64 and 4.12) respectively over the months.

3.3 Microbial population. It has been observed that the untreated fruit juice products were highly contaminated with bacteria and yeast. The data presented in Table 9 and 10 depicts minimum increase in bacteria and yeast population of pummelo juice blended with sugarcane and ginger juice. In view of the microbial analysis of the

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stored juice samples it was observed that all the samples were contaminated with a large variety of bacterial and fungal species but within the acceptable limit. The juice blended with 2% ginger juice (T_6) was lowest in yeasts (4.20×10^3 and 4.23×10^3 cfu/ml juice) and bacterial (1.03×10^3 and 1.29×10^3 cfu/ml juice) followed by T_1 (4.70×10^3 and 5.04×10^3 cfu/ml juice) for yeast and (1.60×10^3 and 1.71×10^3 cfu/ml juice) for bacterial population at refrigerated and ambient storage respectively as recorded at the end of storage period (eight months). The maximum yeast population was observed in T_7 (5.90×10^3 and 6.55×10^3 cfu/ml juice) and that of bacterial (2.20×10^3 and 2.65×10^3 cfu/ml juice) at refrigerated and ambient temperature respectively.

IV. DISCUSSION

Retention or minimum increase in total soluble solids content of juice during storage is desirable for preservation of good juice quality. The result of pummelo nectar indicated that, the TSS content in both the temperatures (refrigerated and ambient) increased with increased in duration of storage for 8 months might be due to hydrolysis of polysaccharides into monosaccharide and oligosaccharides [17]; [18]. Similar results were also reported by [10] and [9] in lime-aonla and mango-pineapple spiced RTS beverages and [19] in jamun squash and jam were increased upto 6 months.

The rate of increase of total and reducing sugar was more at ambient temperature than refrigerated temperature, because sucrose reacts with organic acids and gives invert sugar (hydrolysis of sugar) as noted by [20], [17]. The same results were also observed by [21] in kinnow juice and [22] and [23] in citrus juice. The change in total sugars content of beverage was almost negligible during storage for 6 months in bael: papaya (2:3) pulps blend [24]. Earlier, similar results were also reported by [10] in mango juice blends, [12] in Kinnow juice blend. The degree of conversion obviously was more at ambient temperature than the refrigerated temperature [20].

Ascorbic acid content in both the storage conditions shows decreasing trend probably due to the fact that ascorbic acid being sensitive to oxygen, light and heat and easily oxidized in presence of oxygen by both enzymatic and non-enzymatic catalyst [25]. The same observations were also reported by [26]; [18]. [27] also found the concentration of vitamin C in Valencia orange juices was decreased during storage at 5 and 25^{o}C. Beside these researches, [28] found that if the juices stored in open containers in a refrigerator for 31 days, the ascorbic acid loss was around 60 to 67%. [29] also reported the same observation while study on orange juices of cv. Sai Nam Pung and Khieo Waan.

The decreasing trend of acidity in the storage might be due to chemical interaction between organic constituent of juice induced by temperature and action of enzymes. These results are in conformity with studies in kinnow blended juice [30] citrus juice [22], lemon juice [31] and aonla pulp and juice [32].

Results of organoleptic evaluation indicated that aroma, colour and organoleptic (bitterness) score of juice blends, decreased with advancement of storage period. The colour, aroma, taste and appearance as well as higher nutrient elements of the blends were found to be superior as compared to the juices prepared from individual fruits. [24] reported that addition of papaya pulp with bael pulp was found to be very effective in checking the browning and improving the appearance of the beverage. They also observed that the beverage prepared from 2:3 blend of bael:papaya pulp scored maximum (7.4 out of 10.0) after six months of storage. The result is well supported by [33] in case of guava nectar and [12] in Kinnow juice blend. The beneficial results of thermal processing might be due to inhibition of polyphenol oxidase and the enzyme involved in discolouration and developing of off aroma during storage. Later, the opinion was supported by works of [34] in apple juice.

[12] and [18] reported that minimum population of bacteria, mould and yeasts in kinnow juice blended with ginger juice at the ratio of (87:10:3). [9] reported negligible growth of moulds and yeasts in lime-aonla and mango-pineapple spiced RTS beverages, which got further reduced during storage due to inhibitory effect and antioxidative properties of spices. [10] reported that no bacterial growth was observed in the spiced mixed fruit juice, RTS beverages. These results were supported by several researchers, [35] in spiced mixed fruit juices, [36] in mixed vegetable juice.

V. CONCLUSIONS

From the present research, it was concluded that the juice blend pummelo juice: pineapple juice (50:50) was most effective juice blend for higher values of total sugar (12.04 and 13.02%), reducing sugar (6.89 and 11.13%) and

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ascorbic acid (25.20 and 25.78 mg/100 ml juice) at refrigerated and room storage respectively. Sensory evaluation score was also higher, flavour and taste score up to the end of storage. However, the higher value for TSS content was observed in T_7 (17.40 and 17.50°Brix respectively), and that for acid content was in T_4 blend (pummelo: pineapple: beetroot- 36:60:4) at both the storage conditions respectively. The juice blend ratio of pummelo: sugarcane: ginger (58:40:2) was best of minimum population of yeast (4.20×10^3 and 4.23×10^3) and bacteria (1.03×10^3 and 1.29×10^3) at refrigerated and room temperature at end of storage (eight months). On the basis of the results revealed in the present study, it may be concluded that formulation of mixed (blend) juice beverage is possible to satisfy consumer taste and preferences. These juice blends can be stored effectively for a period of 8 months at refrigerated and room temperature with little changes in their microbial, physico-chemical and organoleptic properties.

REFERENCES

[1]. Kuhn, M.E. 1998, "Functional food overdose," Food Proc. Mag. 59(5), 21-48.
[2]. Swientek, B. 1998, "Toasts of the town,". Prep. Foods. Pp, 21-26.
[3]. Menrad, M., Husing, B., Menrad, K., Reib, T., Beer-Borst, S. and Zenger, C.A. 2000, "Functional Food," TA 37/2000. Bern, Schweizerischer Wissenschafts und-Technologierat.
[4]. Saenz, C. and Sepulveda, E. 1999, "Physical and Sensory Characteristics of Fruit Juice", Paris, Annals of the 22nd IFU Symposium Paris.
[5]. Burana-Osota, J., Soonthornchareonnonb, N., Chaidedgumjorna, A., Hosoyamac, S. and Toidac, T. 2010, "Determination of galacturonic acid from pomelo pectin in term of galactose by HPAEC with fluorescence detection," Carbohydr. Poly. 81, 461-465.
[6]. Tsai, H.L., Chang, S.K.C. and Chang, S.J. 2007, "Antioxidant content and free radical scavenging ability of fresh red pummelo [Citrus grandis (L.) Osbeck] juice and freeze-dried products," J. Agri. Food Chem. 55, 2867-2872.
[7]. Mongkolkul, P., Rodart, P., Pipatthitikorn, T., Meksut, L. and Sanguandeekul, R. 2006, "Debittering of Tangerine (Citrus reticulata Blanco.) Juice by β-Cyclodextrin Polymer," J. Incl. Phen. Macro. Chem. 56, 167-170.
[8]. Singh, S.V., Jain, R.K., Gupta, A.K. and Dhatt, A.S. 2003, "Debittering of Citrus Juices- A Review," J. Food Sci. Technol. 40(3), 247-253.
[9]. Deka, B.C. 2000, "Preparation and storage of mixed fruit juice spiced beverages," IARI, New Delhi, India.
[10]. Deka, B.C. and Sethi, V. 2001, "Preparation of mixed fruit juice spiced RTS beverages," Indian Food Pack. 42, 58-61.
[11]. Jain, S.K. and Khurdiya, D.S. 2004, "Vitamin C enrichment of fruit juice based readyto- serve beverages through blending of Indian gooseberry (Emblica officinalis Gaertn.) juice," Plant Foods Hum. Nutr. 59, 63-66.
[12]. Bhardwaj, R.L. and Mukherjee, S. 2011, "Effects of fruit juice blending ratios on kinnow juice preservation at ambient storage condition," Afr. J. Food Sci. 5, 281-286.
[13]. A.O.A.C. (1984), "Official Methods of Analysis," Association of Official Analytical Chemists, AOAC. Washington D.C.
[14]. Ranganna, S. 1977, "Manual of Analysis of Fruit and Vegetable Products," 2nd Edn., Tata Mc Rraw Hill Publishing Company Ltd., New Delhi.
[15]. Ranganna, S. 1994, "Handbook of Analysis and Quality control for fruits and vegetable products," 2nd Edn., Tata, McGraw- Hill Publishing Co. Ltd. New Delhi, India.
[16]. Amerine, M.A., Pangbron, R.M. and Rossler, E.B. 1965, "Principles of sensory evaluation of food," Academic Press, New York, USA.
[17]. Barwal, V.S. and Shrera, S.K. 2009, "Standardization of extraction methods and preservation techniques of hill lemon juice," J. Sci. Ind. Res. 68, 608-610.
[18]. Bhardwaj, R.L. and Mukherjee**,** S. 2012, **"**Factors Affecting Physico-Chemical, Sensory and Microbiological Quality of Kinnow Juice Blends," J. Nutr. Food Sci. 2(6), 1-7.
[19]. Kannan, S. and Thirumaran, A.S. 2004, "Studies on the storage life of jamun (Syzygium cuminii Rom) fruit products," Food Sci. Technol. Mysore, 41**(**2), 186-188.
[20]. Desrosier, N.M. and Desrosier, J.N. 1998, "The technology of food preservation. In, Principal of Food Concentrations," 4th Edition, pp. 259-277, CSB Publisher and Distributes, Shandra, Delhi, India.

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Volume 7, Issue 3 May-June 2022, pp: 951-960 www.ijprajournal.com ISSN: 2456-4494

[21]. Ranote, P.S. and Bains, G.S. 1982, "Juice of Kinnow fruits," Indian Food Pack. 36, 23-33.
[22]. Mehta, U. and Bajaj, S. 1983, "Effect of storage and method of preservation on the physico-chemical characteristics of citrus juices," Indian Food Pack. 37, 42-51 [25] MAPSON, L.W. 1970. Vitamins in fruits. The Biochemistry of Fruits and their Products, Vol. 1, Academic Press, New York, USA.
[23]. Purthi, J.S. 1978, "Processing technology of kinnow mandarin," Punjab Hort. J. 180, 199-202.
[24]. Tandon, D.K., Kumar, S., Dikshit, A. and Shukla, D.K. 2007, "Storage study on bael papaya blended RTS beverage," Indian "Food Pack. 73, 91-95.
[25]. Kaur, K. 2002, "Application of novel juice extraction methods and bacterial utilization of limonin for control of bitterness in kinnow juice," M.Sc. thesis, Thapar Institute of Engg & Tech, Patiala, India
[26]. Li, Z., Alli, I. and Kermasha, S. 1989, "Use of acidification, low temperature and sorbates for storage of orange juice," J. Food Sci. 54, 674-8.
[27]. Kabasakalis, V., Siopidou, D. and Moshatou, E. 2000, "Ascorbic acid content of commercial fruit juices and its rate of loss upon storage," Food Chem. 70, 325-8.
[28]. Supraditareporn, W. and Pinthong, R. 2007, "Physical, Chemical and Microbiological Changes during Storage of Orange Juices cv. Sai Nam Pung and cv. Khieo Waan in Northern Thailand," Int. J. Agri. Biol. 726–730.
[29]. Kumar, R., Kaushik, R.A. and Chharia, A.S. 1992, "Effect of post harvest treatment on the quality of mango during storage." Haryana J. Hort. Sci. 21, 49-53.
[30]. Palaniswamy, K.P. and Muthukrishnan, C.R. 1974, "Studies on the physico-chemical characters of lemon juices and squashes during storage," Indian Food Pack. 28, 37-41.
[31]. Tripathi, V.K., Singh, M.B. and Singh, S. (1988), "Studies on comparative compositional changes in different preserved products of aonla (Emblica officinalis Gaertin) var. Banarasi," Indian Food Pack. 42, 61-65.
[32]. Murari, K. and Verma, R.A. 1989, "Studies on the effect of varities and pulp extraction method on the quality of guava nectar," Indian Food Pack. 43(5), 11-15.
[33]. Kim, D.M., Smith, N.L. and Lee, C.Y. 1993, "Apple cultivar variations in response to heat treatment and minimal processing." J. Food Sci. 58, 1111-1114.
[34]. Ejechi, B.O., Souzey, J.A. and AkpomedayE, D.E. 1998, "Microbial stability of mango (Mangifera indica L.) juice preserved by combined application of mild heat and extracts of two tropical spices," J. Food Prot. 61, 725-727.
[35]. Dhaliwal, M. and Hira, K.C. 2001, "Effect of storage on physico-chemical and nutritional characteristics of carrot-beet root and carrot-black carrot juices," J. Food Sci. Technol. 38, 343-347.

TABLE 1: PREPARE JUICE BLENDS AS PER FOLLOWING BLENDING RATIO

SL. NO.	TYPES OF JUICE	BLENDING RATIO	TREATMENT SYMBOL
1	Pummelo juice + Pineapple juice	50:50	T_1
2	Pummelo juice + Pineapple juice	60:40	T_2
3	Pummelo juice + Pineapple juice	40:60	T_3
4	Pummelo juice + Pineapple juice + Beet juice	36:60:4	T_4
5	Pummelo juice + Sugarcane juice	40:60	T_5
6	Pummelo juice + Sugarcane juice + Ginger juice	58:40:2	T_6
7	Control (Nectar)	100:0:0	T_7

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TABLE 2: PHYSICO-CHEMICAL AND MICROBIOLOGICAL QUALITY OF FRESHLY PREPARED BLENDED NECTAR AT THE TIME OF PROCESSING AND STORAGE

TREATMENTS	TSS (^{O}BRIX)	TOTAL SUGAR (%)	REDUCING SUGAR (%)	ASCORBIC ACID (MG/100ML JUICE)	ACIDITY (%)	YEAST POPULATION	BACTERIA POPULATION
T_1	15.00	5.41	2.81	78.60	1.05	0.00	0.00
T_2	15.00	4.59	2.59	60.40	0.89	0.00	0.00
T_3	15.40	5.22	2.63	73.50	0.99	0.00	0.00
T_4	14.60	2.77	2.40	52.40	0.57	0.00	0.00
T_5	14.80	3.97	2.53	58.80	0.76	0.00	0.00
T_6	14.80	3.07	2.50	55.20	0.67	0.00	0.00
T_7	15.20	2.24	2.19	48.25	1.28	0.00	0.00

T_1= Pummelo + Pineapple (50:50), **T_2**= Pummelo + Pineapple (60:40), **T_3**= Pummelo + Pineapple (40:60), **T_4**= Pummelo + Pineapple + Beetroot (36:60:4),
T_5= Pummelo + Sugarcane (40:60), **T_6**= Pummelo + Sugarcane + Ginger, (58:40:2) **T_7**= Control

TABLE 3: EFFECT OF BLENDING RATIO AND STORAGE ON TOTAL SOLUBLE SOLIDS (^{O}Brix) CONTENTS OF PUMMELO NECTAR DURING STORAGE PERIOD

MONTHS	TREATMENTS													
	REFRIGERATED TEMPERATURE							ROOM TEMPERATURE						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_1	T_2	T_3	T_4	T_5	T_6	T_7
1	15.76^{b}	15.40^{c}	15.53^{c}	14.83^{e}	15.10^{d}	14.86^{e}	16.20^{a}	15.83^{b}	15.50^{bcd}	15.76^{bc}	14.90^{e}	15.36^{cd}	15.10^{de}	16.30^{a}
2	15.96^{b}	15.60^{bcd}	15.73^{bc}	15.16^{d}	15.43^{cd}	15.23^{d}	16.50^{a}	16.03^{b}	15.53^{c}	15.96^{b}	15.10^{d}	15.43^{cd}	15.30^{cd}	16.40^{a}
3	16.23^{ab}	15.80^{c}	15.93^{bc}	15.36^{d}	15.63^{cd}	15.40^{d}	16.60^{a}	16.23^{b}	15.76^{c}	16.20^{b}	15.36^{d}	15.76^{c}	15.43^{cd}	16.60^{a}
4	16.36^{ab}	16.10^{bcd}	16.16^{cd}	15.60^{d}	15.90^{bcd}	15.70^{cd}	16.70^{a}	16.50^{ab}	15.90^{c}	16.33^{b}	15.50^{d}	15.80^{cd}	15.63^{cd}	16.80^{a}
5	16.56^{ab}	16.23^{bcd}	16.36^{bc}	15.80^{d}	16.06^{bcd}	15.96^{cd}	16.90^{a}	16.70^{a}	16.13^{b}	16.56^{a}	15.63^{c}	16.10^{b}	15.83^{bc}	16.90^{a}
6	16.73^{ab}	16.43^{bc}	16.53^{abc}	16.00^{c}	16.33^{bc}	16.16^{c}	17.00^{a}	16.90^{ab}	16.30^{c}	16.76^{b}	15.70^{e}	16.23^{cd}	15.96^{de}	17.10^{a}
7	16.96^{ab}	16.66^{abcd}	16.80^{abc}	16.20^{d}	16.56^{bcd}	16.30^{cd}	17.20^{a}	17.16^{a}	16.56^{b}	17.03^{a}	15.96^{d}	16.50^{b}	16.23^{c}	17.30^{a}
8	17.13^{ab}	16.86^{bc}	17.00^{ab}	16.33^{d}	16.76^{bcd}	16.43^{cd}	17.40^{a}	17.36^{a}	16.76^{b}	17.23^{a}	16.36^{c}	16.70^{b}	16.50^{bc}	17.50^{a}

T_1= Pummelo + Pineapple (50:50), **T_2**= Pummelo + Pineapple (60:40), **T_3**= Pummelo + Pineapple (40:60), **T_4**= Pummelo + Pineapple + Beetroot (36:60:4),
T_5= Pummelo + Sugarcane (40:60), **T_6**= Pummelo + Sugarcane + Ginger, (58:40:2) **T_7**= Control
Values followed by different superscript letters are significantly (P< 0.05) different from each other

TABLE 4: EFFECT OF BLENDING RATIO AND STORAGE ON TOTAL SUGAR (PERCENT FRESH WEIGHT) CONTENTS OF PUMMELO NECTAR DURING STORAGE PERIOD

MONTHS	TREATMENTS													
	REFRIGERATED TEMPERATURE							ROOM TEMPERATURE						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_1	T_2	T_3	T_4	T_5	T_6	T_7
1	5.56^{a}	5.05^{ab}	5.27^{ab}	3.36^{cd}	4.19^{bc}	3.63^{cd}	2.63^{d}	6.44^{a}	5.44^{ab}	6.11^{a}	3.16^{c}	4.51^{b}	3.27^{c}	2.57^{c}
2	6.10^{a}	5.44^{abc}	5.80^{ab}	4.30^{cd}	5.00^{abc}	4.71^{bcd}	3.54^{d}	7.44^{a}	5.78^{bc}	6.59^{ab}	3.25^{d}	4.69^{c}	3.43^{d}	2.70^{d}
3	6.59^{a}	5.99^{ab}	6.28^{a}	5.21^{b}	5.87^{ab}	5.67^{ab}	5.11^{b}	7.47^{a}	6.03^{bc}	6.80^{ab}	3.44^{d}	4.96^{c}	3.69^{d}	3.03^{d}
4	7.56^{a}	6.64^{abc}	6.93^{ab}	5.71^{cd}	6.13^{bcd}	5.80^{cd}	5.41^{d}	8.07^{a}	6.69^{b}	7.42^{ab}	3.68^{d}	5.14^{c}	3.84^{d}	3.57^{d}
5	8.38^{a}	7.48^{ab}	7.97^{ab}	6.28^{cd}	7.26^{bc}	7.03^{bc}	6.00^{d}	9.80^{a}	7.94^{b}	9.29^{a}	5.26^{cd}	6.51^{c}	5.96^{cd}	4.95^{d}
6	9.27^{a}	8.02^{ab}	8.54^{ab}	6.56^{c}	7.57^{bc}	7.37^{bc}	6.26^{c}	10.68^{a}	8.79^{bc}	10.20^{ab}	6.39^{de}	7.48^{cd}	6.63^{de}	5.88^{e}
7	10.33^{a}	9.17^{bc}	9.68^{ab}	7.45^{de}	8.31^{cd}	7.90^{d}	6.70^{e}	11.66^{a}	10.06^{bc}	10.91^{ab}	7.89^{d}	8.64^{cd}	8.40^{d}	7.31^{d}
8	12.04^{a}	10.93^{ab}	11.31^{a}	8.95^{c}	10.55^{ab}	9.58^{bc}	8.76^{c}	13.02^{a}	11.49^{bc}	12.28^{ab}	9.09^{de}	10.77^{c}	10.40^{cd}	8.19^{e}

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T_1= Pummelo + Pineapple (50:50), T_2= Pummelo + Pineapple (60:40), T_3= Pummelo + Pineapple (40:60), T_4= Pummelo + Pineapple + Beetroot (36:60:4),
T_5= Pummelo + Sugarcane (40:60), T_6= Pummelo + Sugarcane + Ginger, (58:40:2) T_7= Control
Values followed by different superscript letters are significantly (P< 0.05) different from each other

TABLE 5: EFFECT OF BLENDING RATIO AND STORAGE ON REDUCING SUGAR (PERCENT FRESH WEIGHT) CONTENTS OF PUMMELO NECTAR DURING STORAGE PERIOD

MONTHS	TREATMENTS													
	REFRIGERATED TEMPERATURE							ROOM TEMPERATURE						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_1	T_2	T_3	T_4	T_5	T_6	T_7
1	2.90^{a}	2.64^{bc}	2.76^{ab}	2.50^{cd}	2.61^{bc}	2.59^{c}	2.43^{d}	3.07^{a}	2.70^{bc}	2.80^{b}	2.50^{d}	2.65^{c}	2.63^{c}	2.46^{d}
2	3.09^{a}	2.76^{c}	2.91^{b}	2.50^{d}	2.75^{c}	2.69^{c}	2.43^{d}	3.19^{a}	2.91^{bc}	3.07^{ab}	2.61^{d}	2.83^{c}	2.78^{c}	2.52^{d}
3	3.25^{a}	3.02^{abc}	3.15^{ab}	2.80^{cd}	2.98^{bc}	2.84^{cd}	2.70^{d}	3.57^{a}	3.15^{b}	3.21^{b}	2.97^{b}	3.09^{b}	3.04^{b}	2.89^{b}
4	3.52^{a}	3.31^{abc}	3.37^{ab}	3.11^{cd}	3.25^{bcd}	3.16^{bcd}	3.07^{d}	4.73^{a}	3.51^{bc}	3.82^{b}	3.20^{bc}	3.34^{bc}	3.27^{bc}	3.03^{c}
5	3.90^{a}	3.69^{ab}	3.81^{a}	3.21^{c}	3.47^{bc}	3.43^{bc}	3.14^{c}	7.22^{a}	4.70^{bc}	5.91^{ab}	4.07^{c}	4.61^{bc}	4.34^{c}	3.99^{c}
6	4.62^{a}	4.03^{bc}	4.25^{ab}	3.47^{de}	3.90^{bcd}	3.70^{cde}	3.44^{e}	7.84^{a}	6.08^{abc}	6.49^{ab}	5.18^{bc}	6.01^{abc}	5.53^{bc}	4.18^{c}
7	5.23^{a}	4.43^{ab}	5.21^{a}	3.72^{bc}	3.95^{bc}	3.86^{bc}	3.47^{c}	9.45^{a}	7.28^{ab}	8.59^{ab}	6.12^{bc}	6.65^{bc}	6.36^{bc}	4.54^{c}
8	6.89^{a}	5.20^{b}	5.53^{b}	4.20^{c}	5.12^{b}	4.43^{c}	4.16^{c}	11.13^{a}	8.84^{ab}	10.10^{ab}	7.52^{bc}	8.25^{abc}	7.83^{bc}	5.33^{c}

T_1= Pummelo + Pineapple (50:50), T_2= Pummelo + Pineapple (60:40), T_3= Pummelo + Pineapple (40:60), T_4= Pummelo + Pineapple + Beetroot (36:60:4),
T_5= Pummelo + Sugarcane (40:60), T_6= Pummelo + Sugarcane + Ginger, (58:40:2) T_7= Control
Values followed by different superscript letters are significantly (P< 0.05) different from each other

TABLE 6: EFFECT OF BLENDING RATIO AND STORAGE ON ASCORBIC ACID (mg/100ml of juice) CONTENTS OF PUMMELO NECTAR DURING STORAGE PERIOD

MONTHS	TREATMENTS													
	REFRIGERATED TEMPERATURE							ROOM TEMPERATURE						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_1	T_2	T_3	T_4	T_5	T_6	T_7
1	63.97^{a}	53.90^{abc}	58.80^{ab}	41.65^{de}	50.61^{bcd}	46.55^{cde}	37.15^{e}	76.41^{a}	72.05^{ab}	73.88^{ab}	63.31^{b}	71.75^{ab}	69.86^{ab}	52.40^{c}
2	65.13^{a}	47.85^{bc}	56.06^{ab}	36.93^{cd}	43.66^{bcd}	37.60^{cd}	28.90^{d}	76.80^{a}	64.00^{ab}	72.53^{a}	46.93^{bc}	64.00^{ab}	51.20^{bc}	38.40^{c}
3	54.63^{a}	38.53^{b}	42.26^{b}	29.76^{b}	36.80^{b}	32.71^{b}	28.00^{b}	62.50^{a}	51.25^{abc}	60.41^{ab}	37.50^{c}	49.16^{abc}	43.75^{bc}	37.35^{c}
4	49.70^{a}	28.40^{bc}	30.76^{b}	21.30^{bc}	28.40^{bc}	23.66^{bc}	17.30^{c}	52.43^{a}	44.36^{abc}	46.58^{ab}	32.26^{cd}	44.36^{abc}	36.30^{bcd}	24.00^{d}
5	43.70^{a}	25.30^{bc}	29.90^{b}	18.40^{cd}	25.30^{bc}	20.70^{cd}	14.00^{d}	46.38^{a}	38.31^{ab}	42.35^{ab}	25.30^{c}	34.28^{b}	26.21^{c}	23.80^{c}
6	34.50^{a}	25.30^{abc}	29.90^{ab}	16.10^{c}	20.70^{bc}	18.40^{bc}	13.80^{c}	41.65^{a}	35.70^{ab}	37.68^{ab}	23.60^{c}	31.73^{bc}	23.80^{c}	23.80^{c}
7	28.73^{a}	21.83^{ab}	24.01^{ab}	13.10^{b}	19.65^{ab}	17.46^{b}	13.10^{b}	34.80^{a}	23.35^{b}	27.06^{ab}	18.55^{bc}	21.35^{b}	19.33^{bc}	11.60^{c}
8	25.20^{a}	16.66^{b}	22.35^{a}	12.80^{b}	15.90^{b}	15.05^{b}	12.50^{b}	25.78^{a}	18.25^{b}	18.35^{b}	12.60^{bc}	17.13^{bc}	15.78^{bc}	11.30^{c}

T_1 = Pummelo + Pineapple (50:50), T_2 = Pummelo + Pineapple (60:40), T_3 = Pummelo + Pineapple (40:60), T_4 = Pummelo + Pineapple + Beetroot (36:60:4),
T_5 = Pummelo + Sugarcane (40:60), T_6 = Pummelo + Sugarcane + Ginger, (58:40:2) T_7 = Control

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TABLE 7: EFFECT OF BLENDING RATIO AND STORAGE ON TITRATABLE ACIDITY (PERCENT FRESH WEIGHT) CONTENTS OF PUMMELO NECTAR DURING STORAGE PERIOD

MONTHS	TREATMENTS													
	REFRIGERATED TEMPERATURE							ROOM TEMPERATURE						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_1	T_2	T_3	T_4	T_5	T_6	T_7
1	0.63^{d}	0.85^{bc}	0.91^{b}	1.21^{a}	0.70^{d}	0.63^{d}	0.96^{b}	0.73^{c}	0.94^{bc}	0.99^{b}	1.47^{a}	0.85^{bc}	0.84^{bc}	1.05^{b}
2	0.43^{d}	0.56^{c}	0.59^{bc}	0.89^{a}	0.48^{d}	0.46^{d}	0.61^{b}	0.69^{c}	0.86^{bc}	0.92^{bc}	1.24^{a}	0.76^{bc}	0.75^{bc}	0.98^{b}
3	0.38^{e}	0.44^{cd}	0.47^{c}	0.73^{a}	0.42^{cde}	0.41^{de}	0.57^{b}	0.59^{d}	0.74^{bcd}	0.82^{bc}	1.28^{a}	0.64^{d}	0.62^{d}	0.88^{b}
4	0.25^{d}	0.36^{bc}	0.38^{bc}	0.50^{a}	0.31^{cd}	0.29^{cd}	0.42^{ab}	0.49^{c}	0.62^{bc}	0.70^{bc}	1.15^{a}	0.58^{bc}	0.56^{bc}	0.73^{b}
5	0.22^{c}	0.27^{c}	0.30^{bc}	0.44^{a}	0.26^{c}	0.24^{c}	0.38^{ab}	0.45^{d}	0.52^{bcd}	0.64^{bc}	1.02^{a}	0.51^{bcd}	0.47^{cd}	0.67^{b}
6	0.16^{e}	0.22^{cd}	0.25^{c}	0.38^{a}	0.20^{de}	0.19^{de}	0.31^{b}	0.40^{c}	0.47^{bc}	0.56^{bc}	0.96^{a}	0.44^{bc}	0.43^{bc}	0.58^{b}
7	0.14^{b}	0.17^{b}	0.20^{b}	0.32^{a}	0.17^{b}	0.15^{b}	0.29^{a}	0.30^{d}	0.39^{bcd}	0.46^{bc}	0.83^{a}	0.37^{cd}	0.35^{cd}	0.48^{b}
8	0.10^{d}	0.14^{cd}	0.16^{bc}	0.28^{a}	0.12^{cd}	0.11^{cd}	0.21^{b}	0.26^{c}	0.31^{bc}	0.37^{b}	0.64^{a}	0.30^{bc}	0.29^{bc}	0.39^{b}

T_1= Pummelo + Pineapple (50:50), **T_2**= Pummelo + Pineapple (60:40), **T_3**= Pummelo + Pineapple (40:60), **T_4**= Pummelo + Pineapple + Beetroot (36:60:4),
T_5= Pummelo + Sugarcane (40:60), **T_6**= Pummelo + Sugarcane + Ginger, (58:40:2) **T_7**= Control
Values followed by different superscript letters are significantly (P< 0.05) different from each other

TABLE 8: EFFECT OF BLENDING RATIO AND STORAGE ON SENSORY QUALITY OF PREPARED PUMMELO NECTAR DURING STORAGE

TREATMENTS	REFRIGERATED TEMPERATURE				ROOM TEMPERATURE			
	COLOUR	AROMA	TASTE	OVERALL ACCEPTABILITY	COLOUR	AROMA	TASTE	OVERALL ACCEPTABILITY
T_1	7.75^{a}	7.87^{a}	7.81^{a}	7.81^{a}	8.37^{a}	8.12^{a}	7.25^{a}	7.91^{a}
T_2	7.50^{ab}	6.75^{b}	6.93^{ab}	7.06^{b}	7.56^{b}	7.06^{b}	6.87^{a}	7.16^{ab}
T_3	7.75^{a}	6.93^{b}	7.06^{ab}	7.25^{ab}	8.06^{ab}	8.12^{a}	7.00^{a}	7.72^{a}
T_4	6.62^{c}	6.37^{b}	2.31^{d}	5.10^{d}	6.12^{d}	3.56^{d}	3.37^{b}	4.35^{d}
T_5	7.06^{bc}	6.50^{b}	6.68^{b}	6.75^{bc}	6.87^{c}	6.43^{bc}	6.18^{a}	6.50^{b}
T_6	6.81^{c}	6.56^{b}	4.87^{c}	6.08^{c}	6.25^{d}	5.75^{c}	3.50^{b}	5.16^{c}
T_7	7.93^{a}	4.25^{c}	1.75^{d}	4.64^{d}	8.56^{a}	2.00^{e}	1.81^{c}	4.12^{d}

T_1= Pummelo + Pineapple (50:50), **T_2**= Pummelo + Pineapple (60:40), **T_3**= Pummelo + Pineapple (40:60), **T_4**= Pummelo + Pineapple + Beetroot (36:60:4),
T_5= Pummelo + Sugarcane (40:60), **T_6**= Pummelo + Sugarcane + Ginger, (58:40:2) **T_7**= Control
Values followed by different superscript letters are significantly (P< 0.05) different from each other

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TABLE 9: EFFECT OF BLENDING RATIO AND STORAGE ON YEAST POPULATION OF PUMMELO NECTAR DURING STORAGE PERIOD (MICROBIAL LOAD CFU (×10^3) PER ML JUICE)

MONTHS	TREATMENTS													
	REFRIGERATED TEMPERATURE							ROOM TEMPERATURE						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_1	T_2	T_3	T_4	T_5	T_6	T_7
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.54^{c}	0.54^{c}	0.64^{bc}	0.65^{bc}	0.70^{b}	0.26^{d}	1.00^{a}	0.62^{cd}	0.54^{d}	0.66^{c}	0.69^{bc}	0.79^{b}	0.29^{e}	1.25^{a}
4	1.12^{b}	1.29^{ab}	1.41^{ab}	1.41^{ab}	1.50^{a}	0.54^{c}	1.50^{a}	1.24^{d}	1.40^{c}	1.56^{b}	1.47^{bc}	1.54^{bc}	0.54^{e}	2.12^{a}
5	2.37^{c}	2.45^{bc}	2.45^{bc}	2.62^{bc}	2.70^{b}	1.62^{d}	3.20^{a}	2.45^{d}	2.55^{cd}	2.56^{cd}	2.70^{bc}	2.79^{b}	1.70^{e}	3.25^{a}
6	3.24^{d}	3.37^{cd}	3.54^{bcd}	3.62^{bc}	3.70^{b}	2.45^{e}	4.12^{a}	3.29^{e}	3.48^{d}	3.65^{c}	3.72^{c}	4.05^{b}	2.38^{f}	4.50^{a}
7	3.95^{c}	4.12^{c}	4.38^{b}	4.45^{b}	4.45^{b}	3.45^{d}	5.00^{a}	4.12^{d}	4.31^{cd}	4.57^{bc}	4.63^{b}	4.54^{bc}	3.29^{e}	5.50^{a}
8	4.70^{c}	4.70^{c}	5.12^{b}	5.18^{b}	5.37^{b}	4.20^{d}	5.90^{a}	5.04^{c}	5.12^{c}	5.54^{b}	5.55^{b}	5.62^{b}	4.23^{d}	6.55^{a}

T_1= Pummelo + Pineapple (50:50), **T_2**= Pummelo + Pineapple (60:40), **T_3**= Pummelo + Pineapple (40:60), **T_4**= Pummelo + Pineapple + Beetroot (36:60:4),
T_5= Pummelo + Sugarcane (40:60), **T_6**= Pummelo + Sugarcane + Ginger, (58:40:2) **T_7**= Control
Values followed by different superscript letters are significantly (P< 0.05) different from each other

TABLE 10: EFFECT OF BLENDING RATIO AND STORAGE ON BACTERIAL POPULATION OF PUMMELO NECTAR DURING STORAGE PERIOD (MICROBIAL LOAD CFU (×10^3) PER ML JUICE)

MONTHS	TREATMENTS													
	REFRIGERATED TEMPERATURE							ROOM TEMPERATURE						
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_1	T_2	T_3	T_4	T_5	T_6	T_7
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.14^{de}	0.17^{cd}	0.19^{c}	0.21^{bc}	0.23^{b}	0.13^{e}	0.30^{a}	0.18^{d}	0.21^{cd}	0.22^{c}	0.25^{b}	0.27^{b}	0.13^{e}	0.45^{a}
4	0.21^{bc}	0.22^{bc}	0.23^{bc}	0.27^{bc}	0.29^{b}	0.20^{c}	0.52^{a}	0.25^{de}	0.30^{cd}	0.31^{cd}	0.35^{c}	0.41^{b}	0.20^{e}	0.82^{a}
5	0.36^{bc}	0.40^{bc}	0.42^{bc}	0.45^{bc}	0.47^{b}	0.30^{c}	0.65^{a}	0.42^{cd}	0.45^{bc}	0.47^{bc}	0.54^{b}	0.55^{b}	0.34^{d}	1.27^{a}
6	0.43^{d}	0.50^{d}	0.61^{c}	0.62^{c}	0.75^{b}	0.49^{d}	1.25^{a}	0.75^{cd}	0.85^{bc}	0.91^{bc}	0.97^{b}	1.05^{b}	0.64^{d}	1.52^{a}
7	0.95^{de}	1.04^{cde}	1.18^{bcd}	1.33^{abc}	1.47^{ab}	0.84^{e}	1.52^{a}	1.26^{d}	1.31^{cd}	1.39^{cd}	1.44^{bc}	1.55^{b}	0.95^{e}	1.95^{a}
8	1.60^{b}	1.68^{b}	1.74^{b}	1.79^{b}	1.52^{b}	1.03^{c}	2.20^{a}	1.71^{d}	1.81^{cd}	1.90^{cd}	2.00^{bc}	2.12^{b}	1.29^{e}	2.65^{a}

T_1= Pummelo + Pineapple (50:50), **T_2**= Pummelo + Pineapple (60:40), **T_3**= Pummelo + Pineapple (40:60), **T_4**= Pummelo + Pineapple + Beetroot (36:60:4),
T_5= Pummelo + Sugarcane (40:60), **T_6**= Pummelo + Sugarcane + Ginger, (58:40:2) **T_7**= Control
Values followed by different superscript letters are significantly (P< 0.05) different from each other