GAU Research Journal **45** (4) : 214-222 (October 2020)

Development and quality evaluation of Ready-to-serve (RTS) beverage and *tablet* prepared from wild pomegranate (*Punica granatum*)

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Received: 13 August, 2020 Accepted: 07 September, 2020

ABSTRACT

The aim of the study was to develop and evaluate wild pomegranate based functional food products i.e. RTS beverage and *tablet* with respect to nutritional composition, sensory acceptability and microbiological parameters at different storage intervals i.e. fresh, 3, 6 and 9 months. Focusing attention on this neglected and underutilized fruit is an effective way to help maintain a diverse and healthy diet. From the study, it was found that the fruit had high amounts of fibre (5.58 %), anthocyannin (21.38 mg/100g), vitamin C (17.00 mg/100g), pectin (1.86 % as calcium pectate), potassium (155.00 mg/100g) and phosphorous content (86.66 mg/100g). The results for wild pomegranate beverage blended with cultivated pomegranate in different ratios (0:100, 25:75, 50:50,75:25 and 100:00) and pomegranate *tablet* showed that the TSS, acidity, ascorbic acid, total and non-reducing sugars decreased significantly while reducing sugars increased significantly with the increase of storage interval. The TSS, acidity and reducing sugars increased from 17.49-17.86, 0.37-0.51 and 4.72-5.49 while pH, ascorbic acid, total and non –reducing sugars decreased from 3.94-3.89, 2.17-1.75, 15.27-12.61 and 9.99-6.70, respectively. The prepared food products viz., RTS beverage and *tablet* were subjected for sensory evaluation to a panel of 15 members at different storage intervals and the products were found to be acceptable in terms of colour, taste, consistency/texture up to storage interval of 6 months.

Keywords: wild pomegranate, RTS beverage, pomegranate *tablet*, nutrient profiling, storage

Underutilized fruits are the fruits which are neither grown in a cultivated area neither commercially processed but these fruits possess many advantages like easier to grow, producing a crop even under adverse soil and climatic conditions, eco-friendly but still these fruits are neglected and gone as waste due to lack of awareness, unrecognized nutritional value, poor colour, distorted shape, unpleasant taste and aroma. Underused fruit (*wild pomegranate*) was selected for the study, as the fruit is good source of nutrients. Being low input fruit, the fruit can be utilized for agricultural diversification and also provide a unique opportunity to combat food and nutritional insecurity within the communities. India is major pomegranate exporter in the world (Mertens *et al.*, 2006). *Punica granatum*L. (Punicaceae) is a nutrient dense fruit rich in phytochemical compounds (Miguel *et al.*, 2010). The pomegranate tree is about 2–3m tall, glabrous, with multiple trunks and bushy appearance. The fruit is ripened during the month of September- October. The fruit changes its colour from green to yellow and finally turned to red during ripening stage (Holland *et al.*, 2009). The color of the wild pomegranate aril is slightly pink to red in colour. Wild pomegranate tree and fruit is comparatively smaller in size than cultivated pomegranate. The arils are juicy and give slightly tart taste as comparison to cultivated pomegranate fruit. The nutritional and chemical composition of the fruit is largely depending upon the cultivar, growing area, maturity index, cultivation practices, climate, and storage condition etc. (Fadavi *et al.*, 2005). This fruit target various diseases including cardiovascular diseases, cancer, diabetes, male infertility, Alzheimer's disease, aging, and AIDS (Jurenka, 2008 and Neurath *et al.*, 2004). Studies also revealed that pomegranate fruit and its components exhibit potent antioxidative, anti-inflammatory, antibacterial, antimicrobial, and antifungal properties (Gil *et al.*, 2000; Les *et al.*, 2015, Adams *et al.*, 2006; Rasheed *et al.*, 2009; Naz *et al.*, 2007; Fawole *et al.*, 2012; Elsherbiny *et al.*, 2016; Wafa *et al.*, 2017). Being low input agricultural produce and considering its functional properties, the study was planned to analyze the nutritional composition of wild pomegranate based food products so that it could be a solution to the social problem of health and nutrition insecurity.

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MATERIAL AND METHODS

The study was conducted in the year 2010-2012 at CSKHPKV, Palampur (H.P). The wild pomegranate fruits were collected from Shimla district of Himachal Pradesh, India while other ingredients required viz., cultivated pomegranate, sugar, black salt, fat and cinnamon were purchased from the local market. The fruits were analyzed for their physico-chemical analysis. Length and breadth of the fruit was assessed by using vernier caliper. The pH content and TSS was measured by pH meter and refractometer, respectively. Acidity, sugars, ascorbic acid and pectin content were determined by the method of (Srivastava and Kumar 2003). Minerals were assessed as per (AOAC, 2000). The carbohydrates were determined as

Total carbohydrates % = 100 – (moisture,+protein +fat + fibre +ash %).

a. Standardization of juice extraction techniques: After analysis, fruits were washed under running water and different extraction techniques viz., screw type juicer, basket press and cold pulping method were standardized in the laboratory for maximum recovery of juice. Figure 1 represents the appearance of fruit, aril and juice color. The maximum juice recovery was observed in screw type juicer with reported values on the basis of fruit weight (21.10 %) and aril weight is (67.37 %). The pomegranate juice was stored in pre-sterilized glass bottles for the development of RTS beverage. For the development of *tablet*, arils were dried in oven at 60°C for 24 h or until the moisture content is constant. The dried arils were ground in a grinding machine and sieved with the help of muslin cloth. The powder was then packed in airtight containers and stored at room temperature until used for the development of *tablet*. Different formulations of wild pomegranate : cultivated pomegranate were used for the development of RTS beverage and are depicted in Table 1 .

Table 1: Blending proportions of wild pomegranate (WP): Cultivated pomegranate (CP) for development of RTS beverage. Figure 2 shows different blending proportions of wild pomegranate (WP): Cultivated pomegranate (CP) pulp based RTS beverage.a.

Blends	WP:CP
T1	100:00
T2	75:25
T3	50:50
T4	25:75
T5	00:100

Product formulation and quality evaluation of prepared products: The process for the development of functional food products were standardized.

i. RTS Beverage preparation: The RTS beverages were prepared in different formulations (shown in Figure 2) as per the FSSAI guidelines. The ingredients (pulp1000ml, water 7250ml, sugar 1275g) while no preservatives were used for the development of the beverage. The first step was to prepare a syrup by dissolving sugar in water, then pulp was mixed and strained with the help of muslin cloth to obtain a clear beverage. The prepared beverages were poured into pre-sterilized glass bottles, sealed with crown cork and heat processed by dipping in boiling water for 20 minutes at 85°C. The sterilized bottles were stored at room temperature for further analysis.

ii. Pomegranate *tablet*: Pomegranate t*ablet* were basically made for children as an alternate of toffees and gems. The recipe for this product was standardized in the laboratory. All the ingredients (wild pomegranate powder 1000 g, powdered sugar 3000g, cinammon powder 50g, black pepper 100g, fat 100g, black salt 250g and water 700ml) were mixed with water and the material was cooked to a consistency of 85° Brix. No chemical preservatives were used for the development of pomegranate *tablet*. Figure 2 shows that small balls were made, wrapped in a paper and stored in an airtight container at room temperature for further analysis.

iii. Quality evaluation of prepared products: The prepared food products (RTS beverage and pomegranate *tablet*) were stored at room temperature to check the wholesomeness of the products and were analyzed for their nutritional profiling at different storage interval (fresh, 3, 6 and 9 months). Standardized methods (AOAC 2000, Ranganna, 2007 and Srivastava & Kumar , 2003) were used to determine the nutritional parameters.

iv. Sensory evaluation: Sensory evaluation of functional food products were done using a nine-point hedonic scale. The prepared products were evaluated by 15 untrained panelists (Hussain *et al.*, 2006).

v. Statistical analysis: All experiments were performed in triplicates. The results were analyzed by SPSS software by using two-way analysis of variance (ANOVA). The critical difference was calculated at 5 % level of significance.

RESULT AND DISCUSSION

Specific parameters of wild pomegranate fruit : Table 2 shows mean values for length, breadth, weight and specific gravity were recorded as 6.24 (cm), 5.67 (cm) and 95.18 (g) and 1.20 (g/ml) respectively. The mean values for TSS (°B), pH, acidity, total, reducing,

and non reducing sugars were reported as 14.80, 3.64, 6.61, 8.72, 4.69 and 3.89 respectively. Data related to proximate composition reveal that moisture, fat, fibre, ash, protein and total carbohydrate contents were reported as 69.89, 0.13, 5.58, 0.75, 1.51 and 22.14 per cent, respectively. The values for dietary fibre constituents were reported as NDF (19.53 %), ADF (11.00%) and hemicellulose (8.53 %). Functional constituents like Vitamin C, anthocyannin and pectin were determined as 17.00, 21.38 (mg/100g) and 1.86 (%), respectively. Among all the minerals the fruit had high amount of phosphorous (86.66 mg/100gm) and potassium (155 mg/100gm) . The findings are supported by the observations of (Gopalan *et al.*, 2004; Prasad and Bankar 2001; Jlikop *et al.*, 2002; Patil *et al.*, 2003; Rao, 2008; Singh & Kinsly, 2008 and Gupta, 2008).

Quality evaluation of wild pomegranate based products

Pomegranate *tablet*:

Table 3 illustrates effect of storage on nutritional and sensory parameters of pomegranate *tablets*. The value for TSS at fresh was 86.03°B which varied non-significantly (P≤0.05) till 3 months of storage and thereafter decreasing trend was noticed with the advancement of storage period. The decrease in TSS might have been due to the conversion of sugars into acids. The per cent acidity decreased significantly with the increase of storage interval. The decrease in acidity might be due to chemical interaction between organic acids. The ascorbic acid content varied from 13.07 to 9.33 mg/100 g. The values for ascorbic acid at fresh and 3 month had non-significant effect (P≤0.05) but thereafter, the values varied significantly and followed decreasing trend with the enhancement of storage interval. Loss of ascorbic acid might be due to breakdown of ascorbic acid to dehydro-ascorbic acid and increasing instability in enzymatic and non-enzymatic oxidation might have resulted in significant decrease in ascorbic acid content. A considerable loss of ascorbic acid is also reported due to heat processing and enhancement of storage interval. A significant (P≤0.05) elevation in reducing (46.88 to 49.36%) and decrease in total sugars (75.05 to 65.99%) was observed during storage of 9 months. The per cent non-reducing sugars decreased with the increase of storage interval. An increase in reducing sugar occurred due to the conversion of sucrose into glucose and fructose with the increase in storage period.

Data presented in table 3 illustrates about effect of storage on sensory scores of pomegranate *tablet*. The effect of storage on scores for colour were non-significant. The score for colour of *tablet* were 7.20 for fresh and 3 month which decreased to 7.00 and 6.70 for 6 and 9 month of storage. The product was also evaluated for taste, flavour and texture. The product was liked very much in terms of taste, flavour and texture. The values varied significantly and followed decreasing trend with the increase of storage interval. The values were range from 8.50 to 7.80, 8.60 to 7.90 and 8.50 to 7.70 for taste, flavour and texture, respectively. On a whole, storage had non-significant effect on the overall acceptability of the product with mean value reported as 7.95. The reason for decrease in taste and flavour during storage occurred due to the degradation of volatile flavoring substances.

Ready-to-Serve (RTS) beverage

The data pertaining to effect of blending and storage on TSS, pH, acidity, ascorbic acid content and sugars of pomegranate based RTS beverage blended with cultivated pomegranate pulp is presented in Table 4. The initial mean value of TSS for wild pomegranate based RTS beverage was reported as 17.14°B. The TSS values for blending proportions (75:25, 50:50, 25:75 and 00:100) which varied significantly. Irrespective of the blending, the mean value for storage at fresh RTS beverage was noted as 17.49°B which remained almost constant during 3 month of storage and further increased to 17.66 and 17.86°B during 6 and 9 month of storage interval. An increase in TSS during storage might be due to solubilization of solids during storage. An increase in TSS from 10.00 to 10.41°B during storage of 6 months in jack fruit based RTS beverage was observed by (Das, 2009). As the blending of cultivated pomegranate pulp increases, the mean pH value varied non-significantly up to the level of 75:25 and thereafter the mean values varied significantly. However, similar trend was observed as the storage period increased. A decrease in pH during storage might be due to chemical reaction taking place during storage. Similar findings have been reported by (Roy *et al.*, 1997 and Krishnaveni *et al.*, 2001) who observed a decrease in pH from 5.75 to 5.69 after 180 days of storage in jack fruit RTS beverage and 4.0 to 3.82 in mango RTS beverage during 30 days of storage, respectively.

Data pertaining to per cent acidity reveal that as the blending of cultivated pomegranate juice increases, the per cent acidity increases. The highest acidity was noted in pure wild pomegranate based RTS beverage (0.41 %) while lowest in pure cultivated pomegranate based RTS beverage (0.33 %). Irrespective of the blends, with storage the acidity increased. (Kumari, 2007 and Shivani, 2011) reported an increase in acidity during storage of

whey-mango and nectarine based RTS beverage for 90 days and 6 months of storage period, respectively.

Further data reveals that as the proportion of cultivated pomegranate pulp increased, a significant increase in ascorbic acid content was noted. Whereas, with storage the mean ascorbic acid content decreased significantly from 2.17 to 1.75 mg/100 after 9 months of storage interval. The decrease in ascorbic acid content during storage is due to the degradation of ascorbic acid to carbolic acid. (Roy *et al.*, 1997; Krishnaveni, 2001 and Das, 2009) also reported a decrease in ascorbic acid content in jack fruit RTS, mango RTS and jamun RTS beverage, respectively.

The data pertaining to sugars shows effect of blending and storage on wild pomegranate based RTS beverage. The values for reducing sugar content increased significantly with the increase of blending proportions and storage interval. The increase in reducing sugar may be due to conversion of non reducing sugar to reducing sugar on storage. Similar results have been reported by (Roy *et al.*, 1997 and Krishnaveni *et al.*, 2001) in jack fruit and mango based RTS beverage, respectively. On the contrary, the mean value of total sugar of wild pomegranate based RTS beverage increased significantly ($P \leq 0.05$) as the proportion of cultivated pomegranate pulp increased. Irrespective of blending proportions, the mean total sugar content at fresh for RTS beverage increased significantly from 15.27 to 14.26, 13.38 and further to 12.61 per cent after storage period of 3, 6 and 9 months, respectively. Further scrutiny of the data revealed that as the proportion of cultivated pomegranate pulp increased, the non reducing sugars increased from 6.65, 7.85, 8.42, 9.07 and 9.75 per cent in 100:00, 75:25, 50:50, 25:75 and 00:100 wild pomegranate : cultivated pomegranate blends, respectively. With storage, the non-reducing sugar content in freshly prepared wild pomegranate based RTS beverage was decreased during 9 months of storage. Similar trend was recorded for all the blends. The decrease in non-reducing content in RTS beverage may be due to higher rate of conversion of the non-reducing sugars to the reducing sugar. Similar observations have been reported by (Krishnaveni *et al.*, 2001 and Sharma, 2011).

Organoleptic evaluation of Ready-to-serve (RTS) beverage

Table 5 indicates effect of blending of cultivated pomegranate and storage on organoleptic scores. The maximum colour score at fresh was observed for pure cultivated pomegranate based RTS beverage (8.50) whereas minimum colour score was observed for pure wild pomegranate based RTS beverage (7.50). The maximum colour score for pure cultivated pomegranate RTS beverage is due to bright pink colour of the beverage while pure wild pomegranate based RTS beverage had orange red colour which was not acceptable when compared with other blends. However, with storage the mean colour scores decreased with corresponding mean scores for fresh was 8.02, 7.80 (3 month), 7.68 (6 month) and 7.56 (9 month).

Incase of taste and flavor scores, the maximum preference was given to RTS prepared from pure cultivated pomegranate fruit juice. The mean taste and flavor scores for all the blends varied from 6.82 to 8.02 and 7.12 to 7.97, respectively. Among all the blends, the blending proportion of 100:0 and 75:25 had non-significant effect when compared with each other. However, the mean scores for taste as well as flavor decreased from 7.94 to 6.82 and 8.10 to 6.94, respectively. The reason for getting least score for wild pomegranate based RTS beverage is due to the astringent taste of the juice which results in the decrease of scores and as the blending levels of cultivated pomegranate juice increases, the scores for taste and flavor increases.

The scores with regards to consistency reveal that blending of cultivated pomegranate juice up to the level of 50 per cent had non-significant effect on consistency and after that the scores for 25:75 and 100:00 parts of cultivated pomegranate juice varied significantly. The consistency of pure cultivated pomegranate based RTS beverage was "liked very much". However, storage had non-significant effect on consistency up to 6 months of storage period. Similarly, the overall acceptability scores determine that as the blending proportions of wild pomegranate: cultivated pomegranate pulp increased, the overall acceptability of the product increased. However, storage had a significant effect in lowering the overall acceptability of the product. The findings are in line with (Shivani,2011) who reported a decrease in scores for colour, taste, flavour, consistency and overall acceptability of nectarine based RTS beverage during 6 months of storage.

CONCLUSION

Now a day, convenient foods are easily available in the market. However, mostly researchers and food processing industries are focusing on development of food products from cultivated/ conventional food items while little attention has been given for the development of functional food products from underused crops. In this study, efforts have been

Table 2 Specific parameters of wild pomegranate

Parameters	Observations/ Mean values
Physical parameters	
Length (cm)	6.24
Breadth (cm)	5.67
Weight (g)	95.18
Specific gravity (g/ml)	1.20
Nutritional parameters	
TSS (0 B)	14.80
pH	3.64
Acidity (% Citric acid)	6.61
Reducing sugars (%)	8.72
Total sugars (%)	4.69
Non- reducing sugars (%)	3.89
Proximate composition (%)	
Moisture	69.89
Fat	0.13
Fibre	5.58
Ash	0.75
Protein	1.51
Total carbohydrates	22.14
Other parameters	
NDF (%)	19.53
ADF (%)	11
Hemicellulose (%)	8.53
Functional Constituents	
Vitamin C (mg/100g)	17.00
Anthocyanin (mg/100g)	21.38
Pectin (%)	1.86
Minerals(mg/100g)	
Calcium	9.47
Phosphorous	86.66
Magnesium	29.00
Iron	1.91
Pottassium	155

*Data presented in average of triplicate determinations

Table 3 Effect of storage on nutritional and sensory parameters of pomegranate *tablet*

Parameters	Storage (months)					
	Fresh	3	6	9	Mean	CD (P≤0.05)
TSS (0B)	86.03	86.00	85.37	85.03a	85.60	0.16
Acidity (% citric acid)	1.19	1.09a	0.93a	0.73a	0.98	0.02
Ascorbic acid (mg/100g)	13.07	12.13a	10.27a	9.33a	11.20	1.54
Reducing sugars (%)	46.88	47.47a	48.71a	49.36a	48.10	1.12
Total sugars (%)	75.05	72.17a	69.58a	65.99a	70.69	2.02
Non- Reducing sugars (%)	26.72	23.44a	19.82a	15.72a	21.42	2.81
Sensory Parameters (9 point Hedonic Scale)						
Colour	7.20	7.20	7.00	6.70	7.02	NS
Taste	8.50	8.30	8.10	7.80a	8.17	0.48
Flavour	8.60	8.40	8.10 a	7.90 a	8.25	0.43
Texture	8.50	8.30	8.10	7.70a	8.15	0.54
Overall acceptability	8.15	8.10	7.92 a	7.65 a	7.95	NS

*Letters with superscript shows significant difference (P≤0.05)

Table 4 Effect of blending and storage on nutritional parameters of wild pomegranate based Ready-to-serve (RTS) beverage

Parameters	Blends WP: CP	Storage (months) Fresh	3	6	9	Mean
TSS (°B)	100:00	17.00	17.00	17.16 a	17.36 [a]	17.14
	75:25	17.20 [b]	17.20 b	17.33 ab	17.50 [b]	17.30
	50:50	17.53 [ab]	17.60 ab	17.73 ab	17.9b [b]	17.69
	25:75	17.70 [b]	17.70 b	17.80 ab	18.01 [ab]	17.80
	00:100	18.00 [b]	18.00 b	18.26 ab	18.53 [ab]	18.20
	Mean	17.49	17.50	17.66	17.86	
pH	100:00	3.90 [a]	3.89 [a]	3.87 [a]	3.85 [a]	3.88
	75:25	3.91 [ab]	3.90 [ab]	3.89 [ab]	3.87 [ab]	3.89
	50:50	3.96 [ab]	3.93 [ab]	3.91 [ab]	3.89 [ab]	3.92
	25:75	3.97 [b]	3.97 [b]	3.94 [ab]	3.91 [ab]	3.95
	00:100	3.98 [b]	3.98 [b]	3.96 [ab]	3.95 [ab]	3.97
	Mean	3.94	3.93	3.91	3.89	
Acidity (% Citric acid)	100:00	0.41 [b]	0.46 [b]	0.51 [ab]	0.59 [ab]	0.49
	75:25	0.43 [b]	0.42 [b]	0.47 [b]	0.54 [ab]	0.47
	50:50	0.38	0.42 [b]	0.47 [ab]	0.51 [ab]	0.45
	25:75	0.35	0.40	0.42 [a]	0.46 [a]	0.41
	00:100	0.33	0.35	0.39 [a]	0.43 [a]	0.37
	Mean	0.37	0.41	0.45	0.51	
Ascorbic acid (mg/100g)	100:00	1.72 [ab]	1.63 [ab]	1.49 [ab]	1.30 [ab]	1.53
	75:25	1.91 [ab]	1.77 [ab]	1.73 [ab]	1.58 [ab]	1.75
	50:50	2.19 [ab]	2.06 [ab]	1.91 [ab]	1.72 [ab]	1.97
	25:75	2.42 [ab]	2.33 [ab]	2.16 [ab]	2.00 [ab]	2.23
	00:100	2.61 [ab]	2.47 [ab]	2.29 [ab]	2.15 [ab]	2.38
	Mean	2.17	2.05	1.91	1.75	

*Letters with different superscript shows significant difference (P≤0.05)

CD (P≤0.05)	TSS	pH	Acidity	Ascorbic acid
Between Blends (A)	0.05	0.01	0.06	0.06
Between Storage (B)	0.04	0.01	0.05	0.06
Between Blends x Storage (AXB)	0.10	0.02	0.12	0.13

Continued

Parameters	Blends WP: CP	Storage (months) Fresh	3	6	9	Mean
Reducing sugars (%)	100:00	4.42 [ab]	4.57 [ab]	4.74 [ab]	4.95 [ab]	4.67
	75:25	4.56 [ab]	4.87 [ab]	5.08 [ab]	5.35 [ab]	4.96
	50:50	4.73 [ab]	4.95 [ab]	5.35 [ab]	5.59 [ab]	5.15
	25:75	4.85 [ab]	5.09 [ab]	5.58 [ab]	5.76 [ab]	5.32
	00:100	5.07 [ab]	5.34 [ab]	5.59 [ab]	5.85 [ab]	5.46
	Mean	4.72	4.96	5.27	5.49	
Total sugars (%)	100:00	13.42 [ab]	12.05 [ab]	11.04 [ab]	10.14 [ab]	11.66
	75:25	14.43 [ab]	13.42 [ab]	12.97 [ab]	12.09 [ab]	13.22
	50:50	15.03 [ab]	14.44 [ab]	13.42 [ab]	12.93 [ab]	13.96
	25:75	16.36 [ab]	15.05 [ab]	14.45 [ab]	13.41 [ab]	14.82
	00:100	17.09 [ab]	16.36 [ab]	15.03 [ab]	14.46 [ab]	15.74
	Mean	15.27	14.26	13.38	12.61	
Non- reducing sugars (%)	100:00	8.41 [ab]	7.17 [ab]	6.32 [ab]	4.70 [ab]	6.65
	75:25	9.44 [ab]	8.12 [ab]	7.43 [ab]	6.42 [ab]	7.85
	50:50	9.78 [ab]	9.19 [ab]	7.70 [ab]	6.99 [ab]	8.42
	25:75	10.91 [ab]	9.47 [ab]	8.64 [ab]	7.26 [ab]	9.07
	00:100	11.43 [ab]	10.45 [ab]	8.97 [ab]	8.17 [ab]	9.75
	Mean	9.99	8.88	7.81	6.70	

*Letters with different superscript shows significant difference (P≤0.05)

CD (P≤0.05)	Reducing sugars	Total sugars	Non-reducing sugars
Between Blends (A)	0.10	0.76	0.74
Between Storage (B)	0.09	0.68	0.66
Between Blends x Storage (AXB)	0.20	1.53	1.48

Table 5 Effect of blending and storage on organoleptic scores of wild pomegranate based RTS beverage

Parameters	Blends	Storage (months)				
	WP :CP	Fresh	3	6	9	Mean
Colour	100:00	7.50	7.30	7.20	7.10^{a}	7.27
	75:25	7.60	7.50	7.40	7.20^{a}	7.42
	50:50	8.10^{b}	8.00^{b}	8.00^{b}	7.60^{ab}	7.92
	25:75	8.40^{b}	8.30^{b}	7.90^{ab}	8.00^{b}	8.15
	00:100	8.50^{b}	8.30^{b}	7.90^{a}	7.90	8.15
	Mean	8.02	7.80	7.68	7.56	
Taste	100:00	7.10	7.10	6.80^{a}	6.30^{a}	6.82
	75:25	7.70^{b}	7.40	7.10^{a}	6.50^{a}	7.17
	50:50	8.00^{b}	7.70^{b}	7.30^{ab}	6.90^{ab}	7.47
	25:75	8.30^{b}	8.00^{b}	7.60^{ab}	7.10^{ab}	7.75
	00:100	8.60^{b}	8.30^{b}	7.90^{ab}	7.30^{ab}	8.02
	Mean	7.94	7.70	7.34	6.82	
Flavour	100:00	7.70	7.40	6.90^{a}	6.50^{a}	7.12
	75:25	8.00	7.60^{a}	7.10^{a}	6.80^{a}	7.37
	50:50	8.00	7.80^{b}	7.30^{ab}	7.00^{ab}	7.52
	25:75	8.3^{b}	8.00^{b}	7.50^{ab}	7.10^{ab}	7.72
	00:100	8.50^{b}	8.20^{b}	7.90^{ab}	7.30^{ab}	7.97
	Mean	8.10	7.80	7.34	6.94	

*Letters with different superscript shows significant difference (P≤0.05)

CD (P≤0.05)	Colour	Taste	Flavour
Between Blends (A)	0.38	0.38	0.39
Between Storage (B)	0.34	0.34	0.34
Between Blends x Storage (AXB)	0.77	0.77	0.78

Continued

Parameters	Blends	Storage (months)				
	WP :CP	Fresh	3	6	9	Mean
Consistency	100:00	8.50	8.30	8.30	8.20 a	8.32
	75:25	8.50	8.40	8.30	8.20 a	8.35
	50:50	8.30	8.20	8.10	8.00 a	8.15
	25:75	8.50	8.30	8.30	8.00 a	8.27
	00:100	8.40	8.30	8.20	8.10 a	8.25
	Mean	8.44	8.30	8.20	8.10	
Overall Acceptability	100:00	7.70	7.52 ab	7.30 a	7.02 a	7.39
	75:25	7.95 b	7.72 ab	7.47 a	7.17 a	7.58
	50:50	8.10 b	7.92 ab	7.67 ab	7.37 ab	7.77
	25:75	8.37 b	8.15 ab	7.82 ab	7.55 ab	7.97
	00:100	8.50 ab	8.27 ab	7.97 ab	7.65 ab	8.10
	Mean	8.12	7.92	7.65	7.35	

*Letters with different superscript shows significant difference (P≤0.05)

CD (P≤0.05)	Consistency	Overall acceptability
Between Blends (A)	0.33	0.19
Between Storage (B)	0.29	0.17
Between Blends x Storage (AXB)	0.66	0.39

made to prepare RTS (Ready to Serve) beverage(s) and tablet from wild pomegranate fruit. From the findings, it has been concluded that the wild pomegranate fruit had good amount of functional constituents like anthocyannin, fibre and minerals (Phosphorous and potassium). The results showed that there was a significant effect of storage on the nutritional parameters of the pomegranate tablet. The wild pomegranate beverage blended with cultivated pomegranate in different ratios (0:100, 25:75, 50:50,75:25 and 100:00) showed that the TSS, acidity, ascorbic acid, total and non-reducing sugars decreased significantly while reducing sugars increased significantly with the increase of storage interval. The pomegranate tablet and RTS beverage prepared in formulation of (50:50 ratio) of wild pomegranate pulp: cultivated pomegranate pulp was highly acceptable in terms of sensory attributes. On a whole, all the prepared products had good storage life up to 6 months at room temperature. Further study on the development of various food products from the underused fruit (wild pomegranate) is needed to enable food producers to provide a popular wild pomegranate-based food products with enhanced nutritional, sensory parameters, shelf life, and therapeutic properties to meet the nutrition and economic security.

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