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National Academy of Agricultural Science (NAAS) Rating : 3.03

Studies on Blending of Sweet Orange and Pomegranate Juice for RTS Beverage

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ABSTRACT: *The present study was conducted at College of Horticulture, Dr.Y.S.R Horticultural University, Rajendranagar by blending pomegranate juice in different proportions like 10%, 20%, 30%, 40% and 50% with sweet orange RTS (18% juice, 15^{0}B TSS, 0.3% acidity) beverage of 90%, 80%, 70%, 60% and 50% respectively with six treatments, four replications and stored at ambient temperature for three months. Various physico-chemical parameters like TSS (^{o}B), Reducing sugars (%), Total sugars (%), Titrable acidity (%), pH, Ascorbic acid (mg/100g) were analyzed and organoleptic evaluation was carried out for three months with 15 day interval at ambient conditions during storage period with the objective to determine the changes in chemical composition of Sweet orange and pomegranate blended RTS beverage during storage and to evaluate the quality and overall acceptability of the prepared RTS organoleptically. However, maximum acceptability with good appearance, taste, consistency, flavor and storage stability was observed in sweet orange: pomegranate (60:40) blended RTS beverage and recorded as best RTS beverage blend.*

Keywords: *Sweet orange, Pomegranate, Blending, RTS, Beverage*

INTRODUCTION

Citrus fruits are well known for their refreshing fragrance, thirst quenching ability providing adequate vitamin C as per recommended dietary allowance and phytochemicals which play the role of neutraceuticals, such as carotenoids (Lycopene and â-carotene), limonoids, flavanones (Naringins and rutinoside) and vitamin-B complex (Ladaniya, 2008). Pomegranate (*Punica granatum*.L) is a member of family Punicaceae is one of the most favourite table fruits grown in tropical and sub-tropical regions of the world. The fruit has been preferred for its cool refreshing juice and is blended with other fruit drinks. (Kuldeep *et al*., 2006). Pomegranate fruit can be processed to delicately flavoured RTS beverage. Further, pomegranate juice can be blended with other fruit drinks. (Kuldeep *et al*.,2006). Aviram *et al.* (2002) found that, pomegranate juice flavonoids inhibited low-density lipoprotein oxidation and cardiovascular diseases in humans. Extracts of this fruit has antiviral (Polio-virus) activity (Konowalchuk and Speirs, 1976). The blending of fruit drinks could be an economic requisite to utilize, the fruits profitably, as some varieties of fruits used for processing may not have otherwise favourable characteristics such as colour, aroma and mouth feel. The present study has been carried out on blending of sweet orange variety Sathgudi with pomegranate juice to standardize sweet orange – pomegranate blended RTS beverage.

MATERIALS AND METHODS

The present study was carried out by blending pomegranate juice in different proportions like 10%, 20%, 30%, 40% and 50% with sweet orange RTS (18% juice, 15^{0}B TSS, 0.3% acidity) beverage of 90%, 80%, 70%, 60% and 50% respectively with six treatments and stored at ambient temperature for three months.. Various physico-chemical parameters like TSS (^{o}B), Reducing sugars (%), Total sugars (%), Titrable acidity (%), pH, Ascorbic acid (mg/100g) were analysed (AOAC 1965) and organoleptic evaluation was carried out for three months with 15 day interval at ambient conditions during storage period with the objective to determine the changes in chemical composition of Sweet orange and pomegranate blended RTS beverage during storage and to evaluate the quality and overall acceptability of the prepared RTS organoleptically.

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CHEMICAL COMPOSITION OF SWEET ORANGE AND POMEGRANATE BLENDED RTS

Total Soluble Solids

The variation in TSS was found in different treatments which is attributed to processing variations. Sweet orange and pomegranate (50:50) blended RTS beverage (T_5) had higher TSS. Least TSS was found in sweet orange RTS beverage (18% juice, 15^0B TSS, 0.3% acidity) (T_6). Increase of TSS during storage could be due to conversion of polysaccharides to simple sugars and increased acidity during storage. The present results are in accordance with the results obtained by Deka *et al.* (2005) in mango and pineapple spiced beverages, Tripathi *et al.* (1992) in pineapple and guava blended RTS beverage. Nidhi *et al*. (2008) in bael and guava blended beverage and Sandhu and Sindhu (1992) in grape and mango blended RTS beverage.

Reducing Sugars

Maximum reducing sugars were found in sweet orange and pomegranate 60:40 (T_4) blended RTS beverage (Table 1). Increase of reducing sugars during storage was due to inversion of non-reducing sugars to reducing sugars by acids present in the products. Similar observations were made by Tripathi *et al*. (1992) in pineapple and guava blends, Attri *et al*. (1998) in pear and apple blends, Tiwari (2000) in guava and papaya blends and Navya Yadav (2006) in sweet orange and pummelo RTS beverage.

Total Sugars

Total sugars were increased during storage, this might be due to hydrolysis of starch/ sucrose into sugars (Attri *et al*., 1998). Similar results have been reported by Nidhi et al. (2008) in bael-guava blends during storage, Mehta and Bajaj (1982) in citrus juices and Waskar (2003) in pomegranate and kokum blended juice.

Titrable Acidity

Acidity increased during storage due to release of acids from pulp or juice particles due to autolysis of cells and simultaneous decrease of pH. Similar results have been reported by Islam *et al*. (1996) in mango based beverages, Sogi and Singh (2001) in kinnow RTS beverage, Madan Lal Choudhary *et al*. (2006) in guava RTS beverage, Ilamaran and Amutha (2007) in banana and sapota carbonated beverages and Attri *et al*. (1998) in pear-apricot and plum beverage.

pH

Decrease in pH during storage was attributed to simultaneous increase in titrable acidity. These results are in agreement with the findings of Sogi and Singh (2001) in kinnow RTS beverage and Madan Lal Choudhary *et al*. (2006) in guava RTS beverage. In blends, sweet orange and pomegranate (90:10) blended RTS beverage had higher pH at 90^{th} day of storage. This is attributed to compositional changes during storage.

Ascorbic Acid

Among blends significantly higher ascorbic acid content was observed in sweet orange and pomegranate (60:40) blended RTS beverage (T_4), while least ascorbic acid content was found in sweet orange RTS beverage (T_6) (Table 2). This can be due to better vitamin 'C' content in sweet orange and pomegranate. Loss of ascorbic acid during storage due to oxidation by trapped oxygen in glass bottles and formation of dehydro-ascorbic acid, processing and storage temperature. Similar results were reported by Tripathi *et al*. (1992) in pineapple and guava RTS beverage, Attri *et al*. (1998) in pear and apple, apricot, plum blended RTS beverage, Deka (2000) in mango and pineapple blended RTS beverage and Deka (2005) in mango and pineapple spiced beverage.

Organoleptic Quality of Sweet Orange and Pomegranate Blended RTS Beverage

Appearance: Appearance scores were higher with increase in the proportion of pomegranate juice in blends. Loss of colour during storage was due to break down of pigments, oxidative loss of pigments. Similar findings were reported by Tandon *et al*. (2007) in bael and papaya blended RTS beverage, Jadhav *et al*. (2008) in raw kokum RTS beverage, Urmil and Satinder (1983) and Ahmed *et al*. (1981) in citrus juices.

Taste: Taste scores were maximum in sweet orange and pomegranate (60:40) blended RTS beverages. Taste scores were higher with increase in the proportion of pomegranate juice in blends. Loss of taste during storage was due to loss of volatile flavouring compounds. Similar findings were reported by Tandon *et al*. (2007) in bael and papaya blended RTS beverage, Jadhav *et al*. (2008) in raw kokum RTS beverage, Urmil and Satinder (1983) and Ahmed *et al*. (1981) in citrus juices.

Consistency: Maximum consistency scores were found in sweet orange and pomegranate (60:40) blended RTS beverage (T_4). This might be due to increase of cloud and viscosity and consistency scores

due to blending with pomegranate. Consistency score decreased during storage due to change in juice composition. Similar findings were reported by Nair (1986) and Joshi (1994) in kokum fruit products and Jadhav *et al*. (2006) in raw kokum RTS.

Flavour: Highest flavour scores were found in sweet orange and pomegranate (60:40) blended RTS beverage (T_4). This might be due to presence of volatile flavouring compounds. Decline of flavour scores during storage might be due to loss of volatile flavour compounds. The results are in accordance with the findings of Sogi and Singh (2001) in kinnow RTS, Bawa and Saini (1985) in kumkuat RTS beverage and Ranote *et al*. (1993) in kinnow RTS beverage.

Overall Acceptability: Sweet orange and pomegranate (60:40) blended RTS beverage had better overall acceptability scores (Table 3). This was attributed to better appearance, taste, consistency and flavour scores. Decrease of overall acceptability scores during storage was due to decline of colour, taste,

Table 1
Reducing sugars (per cent) of Sweet orange and pomegranate RTS beverage blend during storage

Treatment	*Reducing sugars (per cent)*						
	Days of storage						
	0	*15*	*30*	*45*	*60*	*75*	*90*
T_1-SO:P 90:10	7.66	7.68	8.15	8.43	8.5	8.62	8.62
T_2-SO:P 80:20	7.85	7.90	7.91	7.94	7.96	7.99	7.99
T_3-SO:P 70:30	7.4	7.43	7.82	7.84	7.89	8.17	8.29
T_4-SO:P 60:40	7.49	7.45	7.86	7.92	7.96	7.97	8.64
T_5-SO:P 50:50	7.39	7.35	7.89	8.31	8.46	8.62	8.63
T_6-C (SO)	8.12	8.14	8.22	8.52	8.57	8.51	8.53
Mean	7.65	7.658	7.975	8.16	8.223	8.313	8.45
SEm±	0.04	0.058	0.190	0.165	0.178	0.035	0.178
CD at 5%	0.12	0.174	0.57	0.50	0.534	0.105	0.534

Table 2
Ascorbic acid (mg/100g) of Sweet orange and pomegranate RTS beverage blend during storage

Treatment	*Ascorbic acid (mg/100g)*						
	Days of storage						
	0	*15*	*30*	*45*	*60*	*75*	*90*
T_1-SO:P 90:10		7.2	7.22	7.20	7.12	7.10	6.97
6.90							
T_2-SO:P 80:20	7.27	7.07	6.98	6.86	6.74	6.71	6.61
T_3-SO:P 70:30	7.38	7.37	7.37	7.32	7.16	7.10	6.84
T_4-SO:P 60:40	7.46	7.45	7.34	7.21	7.02	6.93	6.96
T_5-SO:P 50:50	7.46	7.35	7.21	7.02	6.92	6.73	6.72
T_6-C (SO)	6.48	6.45	5.82	5.68	5.41	5.97	5.93
Mean	7.208	6.986	6.986	6.868	6.745	6.735	6.66
SEm±	0.02	0.025	0.091	0.070	0.086	0.053	0.042
CD at 5%	0.06	0.075	0.273	0.21	0.268	0.159	0.126

Table 3
Organoleptic evaluation of Sweet orange and pomegranate RTS beverage

Treatment	*Quality attributes (Average from 0 to 90 days of storage)*				
	Appearance	*Taste*	*Consistency*	*Flavour*	*Overall acceptability*
T_1-SO:P 90:10	4.65	4.76	4.55	4.38	4.587
T_2-SO:P 80:20	4.78	4.64	4.71	4.42	4.639
T_3-SO:P 70:30	4.81	4.81	4.65	4.64	4.729
T_4-SO:P 60:40	4.9	4.91	4.78	4.74	4.823
T_5-SO:P 50:50	4.9	4.64	4.73	4.49	4.703
T_6-C (SO)	3.91	3.63	3.64	3.92	3.777
Mean	4.658	4.565	4.51	4.431	4.543
SEm±	0.012	0.012	0.012	0.012	0.002
CD at 5%	0.036	0.036	0.036	0.036	0.006

consistency and flavour scores . Similar findings were reported by Jadhav *et al*. (2006) in raw kokum RTS beverage and Sogi and Singh (2001) in kinnow RTS beverage.

FUTURE LINE OF WORK

1. RTS blended beverages have to be prepared with different combination of fruits.
2. Neutraceutical beverages like sweet orange blending of aonla, aloevera are to be developed.
3. RTS beverages can be prepared for other under exploited fruits to make available to the consumers throughout the year.

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