

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.702.350>**Development of Freshly Prepared Phalsa-Pear Blended Beverage**Bharat Bhushan Pangotra¹, Neeraj Gupta^{1*} and Arti Sharma²¹Division of Food Science and Technology, SKUAST-Jammu, Chatha-180009, India²Division of Fruit science, SKUAST-Jammu, Chatha-180009, India

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ABSTRACT

Phalsa (*Grewia subinaequalis* L.) fruit is highly perishable in nature and has very short shelf life. Due to its acidic taste it is not palatable, hence processing is essential. Blending of two or more juices is thought to be a convenient alternate for utilizing them in some value added fruit drinks which will be of high quality in respect to both sensory and nutritional aspects. In the present study, phalsa pulp and pear juice were blended in the ratio of 100:00, 95:05, 90:10, 85:15, 80:20, 75:25, 70:30, 65:35, 60:40, 55:45 and 50:50 for the preparation of crush as per FPO specifications. Fresh fruit of phalsa had total soluble solids, acidity, pH, reducing sugar, total sugars, ascorbic acid, anthocyanin, tannin, iron and phosphorous contents of 15.50 °Brix, 1.66 %, 3.50, 12.10 %, 13.24 %, 8.90, 74.12, 1.92, 1.05 and 22.2 mg/100 g, respectively. Whereas, fresh pear fruit recorded the total soluble solids, acidity, pH, reducing sugar, total sugar, ascorbic acid, tannin, iron and phosphorous contents as 12.00 °Brix, 0.24 %, 3.80, 8.72 %, 10.26 %, 2.80, 106.2, 0.20 and 10.2 mg/100 ml, respectively. In the freshly prepared blended crush, highest reducing sugar (32.62 %), total sugar (43.51 %), ascorbic acid (7.38 mg/100 ml) and anthocyanin (18.92 mg/100 ml), tannin (0.43 mg/100ml), iron (0.31 mg/100 ml) and phosphorus (6.87 mg/100 ml) were recorded in treatment T₁ (100:00::phalsa: pear) while as the lowest value were recorded in treatment T₁₁ (50:50::phalsa: pear). Sensory evaluation of blended crush revealed that the highest score of colour (7.72), body (7.34), aroma (7.45), taste (7.44) and overall acceptability (7.48) was recorded in treatment T₅ (80:20:: phalsa: pear), respectively.

Keywords

Phalsa, Pear, Blend, Beverages, Crush

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Introduction

Phalsa (*Grewia subinaequalis* L.), also known as star apple is a subtropical fruit of India. It belongs to the family "Tiliaceae". This family has about 41 genera and 400 species which are mostly distributed in the tropical and subtropical region of the world. In India, it is commercially grown in Punjab, Haryana, Rajasthan, Uttar Pradesh and Madhya

Pradesh. Besides these states, it is also cultivated on limited scale in Maharashtra, Gujarat, Andhra Pradesh, Bihar and West Bengal (Kumar *et al.*, 2014). In Jammu and Kashmir state, it is not cultivated commercially but grown in *kandi* and dry land areas of Kathua, Samba, Jammu, Udhampur, Rajouri and Reasi districts. From these locations, it could find ready market for disposal. Phalsa fruit is ready for picking in S.

India from March to April; whereas in N. India it is harvested in the months of May June. The fruits are highly perishable in nature and due to its perishability, it cannot be exported but its processed products are very appreciable. Ripe fruits are consumed fresh in desserts, or processed into refreshing soft drinks like squash, RTS, sharbat *etc.* which are enjoyed during hot summer months in India.

The attractive crimson red to dark purple colour of phalsa fruit is due to anthocyanin pigments mainly, delphinidin-3-glucoside, cyanidin-3-glucoside and pelargonidin-3, 5 diglucoside. The major phyto-chemical compounds present in the fruit of phalsa are triterpenoids, fatty component, flavonoids (quercetin, quercetin-3-O- β -D-glucoside and naringenin-7-O- β -D-glucoside), steroids, saponins and tannins. The fruits possess very high antioxidant activity due to presence of vitamin C, phenolics, flavonoids, tannins and anthocyanin. In the fruit, highest antioxidant activities are found in fruit peel followed by pulp and seeds (Tiwari *et al.*, 2014). Sand pear (*Pyrus pyrifolia* L.) is an important pome fruit of family "Rosaceae". Pear has lowered acidity, insipid flavor and grittiness, which are the major constraint for its large scale processing. Therefore, owing to presence of such attributes, these fruits are rarely used as fresh or in processing and hence fetch lower price to the grower. Pear fruit is helpful in maintaining acid base balance in human body but the utilization of the hard type of pear (*patharnakh*) has not received much attention for processing so far. Thus blending of phalsa pulp and pear juice offers many opportunities to develop balanced health product high in quality with respect to both sensory and nutritional aspects

Materials and Methods

Ripened fruits of Phalsa (*Grewia subinaequalis* L.) were procured from Raya

Suchani area of district Samba, J&K and fruits of Pear (*Pyrus pyrifolia* L.) cv. *Patharnakh* were procured from revenue orchard of Advance Centre for Horticulture Research (ACHR), Udheywalla, SKUAST-Jammu. Both Phalsa and pear fruits were transported to pilot plant of Division of Food Science and Technology, SKUAST-J, Chatha for further processing. The diseased, defective and unripe fruits were sorted out and thereafter healthy and ripe fruits were retained for extraction of pulp. The phalsa and the pear pulp/juice were blended with each other in different ratios for developing crush (Table 1).

The desired quantity of sugar and citric acid was added in warm water and the solution is strained of through muslin cloth. The solution is added in phalsa-pear blend so as to maintain its total soluble solids as 55 °Brix and an acidity of 1 per cent. The crush prepared was filled in pre-sterilized glass bottle crown corked, processed for 30 min. in boiling water, cooled immediately, labeled. The blended crush was analyzed for physico-chemical and organoleptic evaluation.

Results and Discussion

Physico-chemical composition of fresh fruit

Among most of the fruits; 'phalsa' is very small in size comparable with a pea grain. The fruit however possesses an attractive colour ranging from crimson red to dark purple depending upon its state of maturity. The richness of natural colour is due to plant pigments *viz.*, the anthocyanins in the fruit. This confirms the finding of Khurdiya (1979). The phalsa fruit had an average fruit weight of 0.54 g, whereas pulp and seed cum pomace weight per 100 g of fruit was 85 and 14 g, respectively. These findings were in conformity with the findings of Yadav (1999). The total soluble solids, acidity and pH of freshly prepared phalsa pulp were found to be

15.50 °Brix, 1.66 % and 3.50, respectively, which were in close compliance to the findings of Kaccha *et al.*, (2014), Balaswamy *et al.*, (2011) and Waskar (1985). Reducing sugar, total sugar and ascorbic acid of phalsa pulp were recorded as 12.10 %, 13.24 % and 8.90 mg/100, ml respectively, which were in conformity with the findings of Kumar *et al.*, (2014) and Yadav (1998). Anthocyanin, tannin, iron and phosphorous contents were found to be 74.12, 1.92, 1.05 and 22.20 mg/100 g which were in accordance with the results of Haq *et al.*, (2013), Elhassan and Yagi (2010), Tiwari *et al.*, (2014) and Yadav (1998). Pear fruit cv. *patharnakh* recorded an

average fruit weight of 105.5 g, juice weight per 100 g as 63.8 and seed cum pomace as 35 g. These findings were in accordance with the findings of Raj *et al.*, (2011). Total soluble solids, acidity, pH, reducing sugar, total sugar and ascorbic acid and tannin content were found as 12.00 °Brix, 0.24 %, 3.8, 8.72 % and 10.26 %, 2.80 and 106.2 mg/100 ml, respectively were recorded in pear juices which were in close conformity with the findings of Raj *et al.*, (2011), Mahajan *et al.*, (2013), Rani (1981) and Kohli (1979). Pear fruit was found to contain iron and phosphorous content of 0.20 and 10.2 mg/100 ml, respectively (Table 2).

Table.1 Detail of treatments

Treatment	Phalsa pulp	Pear juice
T ₁	100	00
T ₂	95	05
T ₃	90	10
T ₄	85	15
T ₅	80	20
T ₆	75	25
T ₇	70	30
T ₈	65	35
T ₉	60	40
T ₁₀	55	45
T ₁₁	50	50

Table.2 Physico-chemical composition of fresh fruit of phalsa and pear

	Phalsa	Pear
Physical parameters		
Fruit weight (g)	0.54	105.50
Pulp weight (g/100 g)	85.0	63.80
Seed cum pomace weight (g/100 g)	14.0	35.0
Chemical parameters		
TSS °Brix	15.50	12.0
Acidity (%)	1.66	0.24
pH	3.50	3.80
Reducing sugar (%)	12.10	8.72
Total sugar (%)	13.24	10.26
Ascorbic acid (mg/100 g)	8.90	2.80
Anthocyanin (mg/100 g)	74.12	--
Tannin (mg/100 g)	1.92	106.20
Iron (mg/100 g)	1.05	0.20
Phosphorus (mg/100 g)	22.20	10.20

Table.3 Chemical composition of freshly prepared phalsa-pear blend

Ratio of pulp/Juice Phalsa: Pear	TSS (°Brix)	Acidity (%)	pH	Reducing sugar (%)	Total sugar (%)	Ascorbic acid (mg/100 ml)	Anthocyanin (mg/100 ml)	Tannin (mg/100 ml)	Iron (mg/100 ml)	Phosphorus (mg/100 ml)
T₁(100:0)	15.50	1.66	3.50	12.10	13.24	8.90	74.12	1.92	1.05	22.20
T₂(95:05)	15.00	1.41	3.52	12.07	12.94	8.62	72.10	6.95	1.01	22.11
T₃(90:10)	14.90	1.38	3.54	11.75	12.88	8.40	67.07	11.32	0.99	21.86
T₄(85:15)	14.50	1.36	3.54	11.66	12.71	7.81	64.02	16.17	0.91	21.66
T₅(80:20)	14.00	1.35	3.55	11.27	12.53	7.70	61.93	21.05	0.88	21.44
T₆(75:25)	13.90	1.35	3.57	10.97	12.40	7.42	57.89	26.16	0.78	20.91
T₇(70:30)	13.80	1.32	3.60	10.83	12.25	7.10	52.65	30.92	0.73	20.64
T₈(65:35)	13.30	1.26	3.63	10.55	12.14	6.78	51.66	35.96	0.69	20.34
T₉(60:40)	13.30	1.18	3.65	10.43	11.99	6.50	47.61	41.44	0.66	20.04
T₁₀(55:45)	13.10	1.06	3.68	10.20	11.72	6.20	42.55	46.51	0.61	19.88
T₁₁(50:50)	13.00	0.96	3.70	10.15	11.61	5.88	40.50	52.89	0.59	18.96
Mean	14.02	1.29	3.58	11.08	12.40	7.39	57.46	26.48	0.80	20.91

Table.4 Chemical composition of freshly prepared phalsa-pear blended crush

Ratio of pulp/Juice Phalsa: Pear	TSS (°Brix)	Acidity (%)	pH	Reducing sugar (%)	Total sugar (%)	Ascorbic acid (mg/100ml)	Anthocyanin (mg/100 ml)	Tannin (mg/100 ml)	Iron (mg/100ml)	Phosphorus (mg/100 ml)
T₁(100:0)	55.0	1.0	4.16	32.62	43.51	7.38	18.92	0.43	0.31	6.87
T₂(95:05)	55.0	1.0	4.18	32.50	43.42	7.28	18.62	1.08	0.28	6.79
T₃(90:10)	55.0	1.0	4.19	32.37	43.36	7.02	18.43	1.71	0.25	6.63
T₄(85:15)	55.0	1.0	4.21	32.27	43.33	6.94	18.39	1.97	0.24	6.57
T₅(80:20)	55.0	1.0	4.21	32.25	42.96	6.86	17.37	2.09	0.21	6.51
T₆(75:25)	55.0	1.0	4.24	32.18	42.67	5.90	17.22	2.85	0.21	6.42
T₇(70:30)	55.0	1.0	4.26	32.14	42.61	5.85	16.18	3.96	0.19	6.39
T₈(65:35)	55.0	1.0	4.27	32.02	42.52	4.72	15.17	5.99	0.17	6.36
T₉(60:40)	55.0	1.0	4.28	31.91	42.41	4.51	15.13	8.05	0.16	6.26
T₁₀(55:45)	55.0	1.0	4.30	31.80	42.20	4.12	12.92	9.47	0.15	6.21
T₁₁(50:50)	55.0	1.0	4.30	31.69	42.12	4.07	10.75	12.11	0.12	6.16
Sem (±)	0.02	0.02	0.01	0.02	0.11	0.02	0.02	0.01	0.06	0.01
CD (5 %)	NS	NS	0.03	0.07	0.33	0.07	0.08	0.05	NS	0.05

Table.5 Sensory evaluation of freshly prepared phalsa-pear blended crush

Ratio of pulp/Juice Phalsa: Pear	Colour	Body	Aroma	Taste	Overall acceptability
T₁(100:0)	7.53	6.79	6.82	6.82	6.99
T₂(95:05)	7.45	6.87	6.79	6.91	7.00
T₃(90:10)	7.41	6.95	6.87	7.06	7.07
T₄(85:15)	7.38	6.98	6.53	7.32	7.05
T₅(80:20)	7.72	7.34	7.45	7.44	7.48
T₆(75:25)	7.31	7.29	7.19	7.35	7.28
T₇(70:30)	7.04	7.21	7.12	7.29	7.16
T₈(65:35)	6.93	6.99	7.11	6.98	7.00
T₉(60:40)	6.65	6.65	6.45	6.85	6.65
T₁₀(55:45)	6.44	6.23	6.12	6.75	6.38
T₁₁(50:50)	6.12	6.12	6.07	6.72	6.25
Sem (±)	0.02	0.01	0.02	0.02	0.02
CD (5 %)	0.06	0.05	0.06	0.07	0.06

Chemical composition of fresh phalsa-pear blend

The data revealed that with an increase of pear content in the blends, TSS decreased from 15.50 °Brix to 13.00 °Brix. While as per cent titratable acidity decreased from 1.66 to 0.96 per cent while as pH increased from 3.5 to 3.7. This could be due to the presence of low acidity in the pear fruit. Reducing sugar and total sugar blends also decreased from 12.10 to 10.15 per cent and 13.24 to 11.61 per cent which might be due to lesser concentration in pear juice while as the tannin content of phalsa-pear blends increased from 1.92 to 52.89 mg/100 ml. As far as ascorbic acid, anthocyanin, iron and phosphorous contents were concerned they decreased from the initials level of 8.90 to 5.88, 74.12 to 40.50, 1.05 to 0.59 and 22.20 to 18.96 mg/100 ml, this might be due to the lower concentration of ascorbic acid, anthocyanin, iron and phosphorous content in pear juice than in phalsa pulp (Table 3). These results were in accordance with the findings of Sharma (2005) and Sharma (2012) who worked on the blending of guava-papaya and jamun-mango, respectively.

Chemical composition of fresh phalsa-pear blended crush

The total soluble solids and titratable acidity of all the treatments were maintained at 55°Brix and 1.0 per cent, respectively. The highest pH (4.30) was recorded in T₁₀ (55:45:: phalsa: pear) and T₁₁ (50:50:: phalsa: pear) and the lowest (4.16) in T₁ (100:00:: phalsa: pear). Similar results were reported by Sharma (2012) in jamun-mango squash. The highest and lowest sugars (reducing and total sugar) contents of 32.62, 43.51 and 31.69, 42.12 per cent, respectively were recorded in treatment T₁ (100:00:: phalsa: pear) and T₁₁ (50:50:: phalsa: pear). The highest ascorbic acid, anthocyanin, iron and phosphorous

contents amounting to 7.38, 18.92, 0.31 and 6.87 mg/100 ml, respectively were observed in T₁ (100:00:: phalsa: pear) while lowest 4.07, 10.75, 0.12 and 6.16 mg/100 ml, respectively were observed in treatment T₁₁ (50:50:: phalsa: pear). It can be attributed to higher content of ascorbic acid anthocyanin, iron and phosphorous in phalsa fruit than in pear. The maximum and minimum tannin content of 12.11 and 0.43 mg/100 ml was recorded in T₁₁ (50:50:: phalsa: pear) and T₁ (100:00:: phalsa: pear), respectively (Table 4).

Sensory evaluation of phalsa-pear blended crush

The highest colour, body, aroma, taste and overall acceptability score of 7.72, 7.34, 7.45, 7.44 and 7.48, respectively were recorded for T₅ (80:20:: phalsa: pear) while as the lowest score of 6.12, 6.12, 6.07, 6.72 and 6.25 for colour, body, aroma, taste and overall acceptability, respectively were observed by T₁₁ (50:50:: phalsa: pear). Based on the sensory evaluation scores of different attributes, T₅ (80:20:: phalsa: pear) ranked on the top and was considered the most suitable ratio for making crush (Table 5).

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