Effect of Pulp Concentration on Physicochemical and Organoleptic Changes in RTS and Juice During Storage

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Paper Received on October 19, 2019, Accepted on December 01, 2019 and Published Online on January 01, 2020

ABSTRACT

The experiment was conducted at CCS Haryana Agricultural University, Regional Research Station, Bawal. The ripe fruits of Phalsa were blended with 0.5 litre water per kg fruits and heated to 70 ºC thereafter stained to prepare pure juice. RTS was prepared by adding 10, 12.5 and 15 per cent juice. Total soluble solids (TSS) and acidity were adjusted with the help of sugars and citric acid and fixed to 10º Brix and 0.3 per cent, respectively. TSS and ascorbic acid of the RTS increased with increase in storage period, however, acidity and organoleptic rating decreased with increasing concentration of juice/ pulp. TSS, ascorbic acid and acidity of the RTS decreased with increase in the storage period. However, organoleptic rating increased initially upto 60 days of storage, thereafter it also decreased with the increase in storage period upto 90 days of storage.

***Keywords** : Phalsa (Grewia subinaequalis); RTS; Ascorbic Acid; TSS; Acidity;*

Phalsa *(Grewia subinaequalis)* is one of the important arid fruit crop. *Grewia subinaequalis* is a commercial importance species grown in sub-tropical, tropical and arid region. India is said to be the home of Phalsa, because it is originated in India and South-East Asia. It flourishes well in adverse soil and environmental conditions, where other crops can survive hardly. The fruits of this crop are small in size and having lesser shelf life, ripe fruits can be kept hardly up to two days. Fruits are somewhat astringent and have a cooling effect. Fruit ripe during hot summer and their availability is for a limited period. Ripe fruits are acidic in taste and rich source of vitamins (C and A) and minerals (P and Fe). The post harvest losses in our country are about 20-30 per cent because of poor harvesting techniques, lack of storage and cold chain facility.

The increased production of fruits needs to be supplemented by the proper utilization that would be achieved through processing. Fruits can be processed into RTS, juice, nectar, squash and syrup. Ready to serve and nectar beverages have more potential and better returns and the products can be utilized round the year (*Kumar et al., 2009a*). Phalsa juice has crimson red colour and a pleasant flavor, which is extremely refreshing in summer (*Kumar et al., 2013*). To keep the taste of this fruits among the people for a longer period it has been decided to standardize the preparation of RTS beverages. These products help to ease out fluctuation in the market price farmers may get better returns and consumers the value added products (*Kumar et al., 2015*).

METHODOLOGY

The experiment was conducted in the horticulture laboratory, Regional Research Station, Bawal. The ripened fruits attained deep purple colour was procured from experimental orchard CCS HAU, Regional Research Station, Bawal. Juice was prepared by adding 0.5 litre water per kilogram of ripe fruits. Fruits were blended and heated up to 70ºC thereafter stained for pure juice. RTS was prepared by adding 10.0, 12.5 and 15.0 per cent juice. The total soluble solids (TSS) and acidity were adjusted with the help of sugars and citric

acid and fixed to 10º Brix and 0.3 percent, respectively. The RTS and pure juice were filled in glass bottle of 300 ml and it was pasteurized. These bottles were kept for three months at room temperature and analysed for changes in TSS with the help of hand refractometer (0-32ºB), acidity, ascorbic acids were measured as per standard method suggested by *AOAC (2000)*, and organoleptic rating was estimated on nine hedonic scale basis. The data on changes in physic- chemical parameters and organoleptic rating was observed in three replications at monthly intervals. It was analyzed with the help of completely randomized block design.

RESULTS AND DISCUSSION

Physico - chemical and organoleptic changes in phalsa juice during storage: Pure juice and RTS was filled in glass bottles by keeping 2.5 to 3.0 cm space blank. These bottles along with the juice/ RTS were pasteurized and stored for 90 days and the observations for changes in physicochemical and organolepic rating were recorded at the monthly interval. TSS of the pure juice was increased from 7.74 ºB to 7.90 ºB during storage period of 90 days. An increase in TSS during storage was reported in phalsa juice. Acidity and ascorbic content of pure juice were decreased from 0.413 to 0.387 per cent and 15.5 to 9.4 mg/100g juice, respectively. The organoleptic rating of the juice was not affected significantly during the storage upto 90 days, however, it was not much acceptable even at the day of preparation (Table 1).

Table 1. Physico - chemical and organoleptic changes in phalsa juice during storage

Parameters	Days to storage				CD at
	0	30	60	90	5%
TSS(ºB)	7.74	7.79	7.88	7.90	0.04
Acidity (%)	0.413	0.405	0.391	0.387	0.007
Ascorbic acid (mg/100g juice)	15.5	13.2	11.7	9.4	1.2
Organoleptic rating	4.00	4.15	4.25	4.20	NS

Effect of different pulp concentrations on TSS (ºB) during storage of RTS : Total soluble solids of Phalsa increased from 10.17 to 10.22 ºB with increase in concentration of pulp form 10 per cent to 15 per cent, however, TSS at 12.5 per cent pulp concentration was at par with TSS at 10 and 20 per cent pulp concentration in RTS. This might be attributed to the increased concentration of pulp and further hydrolysis of polysaccharides like pectin and starch into simple sugars. TSS of RTS was increased with the increase in storage period upto 90 days of storage. However, the interaction of pulp concentration with storage period was not affected significantly. Increased in TSS of RTS during storage period might be attributed to hydrolysis of leftover polysaccharides like starch, cellulose and pectic substances into simple soluble solids (*Kumar et al., 2009a*) (Table 2).

Table 2. Effect of different pulp concentrations on TSS (ºB) during storage of RTS

Pulp concentrations (%)	Days to storage				Mean
	0	30	60	90	
10.0	10.00	10.20	10.24	10.25	10.17
12.5	10.00	10.25	10.27	10.28	10.20
15.0	10.00	10.27	10.30	10.31	10.22
Mean	10.00	10.24	10.27	10.28	
CD at 5%		Concentrations: 0.04;			
Storage: 0.02;		Concentrations × Storage : NS			

Effect of different pulp concentrations on acidity (%) during storage of RTS : Acidity decreased from 0.296 to 0.292 per cent with increase in concentration of pulp in RTS from 10 to 15 per cent, it also decreased from 0.30 per cent to 0.288 per cent with the increased in storage period upto 90 days. However, interaction of pulp concentrations with storage period was observed as non significant. The reduction in acidity during storage might be due to chemical reactions (Millard reaction) taking place between organic acid and sugar to form brown pigment. This may be due to chemical interaction between organic constituents of the fruit and reversal glycolytic pathway (*Kumar et al., 2009*)(Table 3).

Table 3. Effect of different pulp concentrations on acidity (%) during storage of RTS

Pulp concentrations (%)	Days to storage				Mean
	0	30	60	90	
10.0	0.300	0.297	0.294	0.291	0.296
12.5	0.300	0.295	0.291	0.288	0.294
15.0	0.300	0.294	0.288	0.285	0.292
Mean	0.300	0.295	0.291	0.288	
CD at 5%		Concentrations : 0.002;			
Storage: 0.003;		Concentrations × Storage: NS			

Effect of different pulp concentrations on ascorbic acid (mg/100ml) during storage of RTS : Increase in pulp concentration from 10 to 15 per cent in RTS also

Table 4. Effect of different pulp concentrations on ascorbic acid (mg/100ml) during storage of RTS

Pulp concentrations (%)	Days to storage				Mean
	0	30	60	90	
10.0	3.70	3.40	2.90	2.20	3.05
12.5	4.10	3.70	3.20	2.40	3.35
15.0	4.50	3.90	3.30	2.60	3.56
Mean	4.10	3.67	3.13	2.40	
CD at 5%		Concentrations: 0.14;			
Storage: 0.16;		Concentrations × Storage: NS			

Table 5. Effect of different pulp concentrations on organoleptic rating during storage of RTS

Pulp concentrations (%)	Days to storage				Mean
	0	30	60	90	
10.0	7.70	7.90	8.00	7.80	7.85
12.5	7.50	7.70	7.80	7.60	7.65
15.0	7.30	7.50	7.60	7.40	7.45
Mean	7.50	7.70	7.80	7.60	
CD at 5%		Concentrations: 0.27;			
Storage: NS;		Concentrations × Storage: NS			

increased ascorbic content from 3.05 to 3.56 mg/100ml in RTS, however, it decreased from 4.10 to 2.40 mg/100ml in RTS with increase in storage period upto 90 days of storage. Interaction of pulp concentration with storage period not affected the ascorbic acid content. Ascorbic acid increased with concentration of juice might be due to more amount of juice used, however, decreased with storage due to thermal oxidation during processing, oxidation into dehydro-ascorbic acid at room temperature (*Kumar et al., 2009*) (Table 4).

Effect of different pulp concentrations on organoleptic rating during storage of RTS: Organoleptic rating of Phalsa RTS decreased with the increase in concentration of the juice, however, it increased with storage upto 60 days thereafter it decreased upto 90 days of storage. Increase in storage period in different pulp concentrations, acidity and orgenoleptic rating of RTS was observed as non significant (Table 5).

CONCLUSION

Pure juice of the Phalsa was not acceptable during the storage upto 90 days of storage and it was not much acceptable even on the date preparation. RTS prepared with 10 and 12.5 per cent pulp concentration was more acceptable as compared 15 per cent pulp concentration. Storage of RTS not affected acceptability; it remains acceptable upto 90 days of storage.

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