Chemical quality parameters of banana Pedha as influenced by pulp content and storage period

HC BADGUJAR, KH PUJARI and PP RELEKAR

Post Graduate Institute of Post Harvest Management
Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri 415712 Maharashtra, India
Email for correspondence: hcbadgujar@gmail.com

 Received: 30.6.2018/Accepted: 24.9.2018

ABSTRACT

Laboratory experiment was conducted for standardization of preparation process of Pedha using banana pulp instead of Khoa, a costly dairy product and other ingredients like sugar, ghee and milk powder at Post Graduate Institute of Post Harvest Management, Roha, Raighad, Maharashtra. The study was conducted with five levels of banana pulp (100, 150, 200, 250 and 300 g) as main treatments and storage at ambient conditions for 0, 5, 10 and 15 days as sub-treatments. The chemical parameters like moisture, TSS, acidity, reducing sugars and total sugars of banana Pedha were studied. The treatments with different pulps and storage periods recorded significant variation in the quality parameters however their interactions were found non-significant for all the traits studied except acidity of banana Pedha. Among the banana pulp treatments 300 g pulp recorded its superiority for highest TSS (76.50°B), reducing sugars (9.33%) and total sugars (60.55%) however the treatment with100 g pulp exhibited minimum moisture (5.02%) and acidity (o.46%). The highest TSS (74.85°B), reducing sugars (9.20%), moisture (7.93%) and total sugars (55.89%) were recorded under treatment of 15 days storage.

Keywords: Banana; Pedha; quality parameters; storage; pulp

INTRODUCTION

Banana is a rich source of carbohydrates, vitamin A and fair source of vitamin C, vitamin B_1 and minerals. Per 100 g banana contains 70.1 per cent moisture, 27.2 per cent carbohydrates, 1.2 per cent protein, 36 mg phosphorous, 17 mg calcium, 0.9 mg iron, 78 mg carotene, 0.08 mg riboflavin, 0.5 mg niacin and 7 mg vitamin C (Gopalan et al 2004). Various types of traditional health foods can be prepared from banana such as Shikran, Pakoda, Burfi, ice cream, vegetables and salad (Landge et al 2010). Puree is one of the processed products which can be commercialized (Chanbisana and Banik 2014). Milk Pedha is a most popular dairy product which is usually prepared by using Khoa. The research work on preparation of Pedha from sapota and mango has been carried out by More (2014) and More (2015) respectively. However to explore the use of banana pulp for Pedha making without Khoa the present investigations were conducted.

MATERIAL and METHODS

Fresh banana fruits at ripe stage and other ingredient such as sugar, corn flour, milk powder, butter (Amul) were procured from local market of Roha, Raigad, Maharashtra and used for the preparation of banana Pedha. The factorial complete randomized design was used with 20 treatments replicated thrice. The treatments comprised different levels of banana pulp viz T_1: 100 g ,T_2: 150 g, T_3: 200 g, T_4: 250 g and T_5: 300 g. The banana Pedha was prepared by adding sugar (200 g), milk powder (135 g), corn flour (20 g) and butter (5 g) in different levels of banana pulp as per treatments. The sub-treatments constituted four storage periods viz S_1: Initial (0 day), S_2: 5 days, S_3: 10 days and S_4: 15 days at ambient conditions. The moisture content of banana pulp was determined using a Contech moisture analyzer (model CA-123) at 100°C. The total soluble solids were determined with the help of hand refractometer (Atago India Instrument Pvt Ltd, Mumbai). Titratable acidity was determined by sample

titrated against 0.1 N (NaOH) solution using phenolphthalein as an indicator (Anon 1975) and the results were expressed as per cent anhydrous citric acid (Ranganna 1986). The reducing sugar and total sugar content were determined by the method suggested by Ranganna (1986).

Chemical composition of banana pulp

In the present investigations the chemical parameters of ripe banana pulp were studied before preparation of Pedha. The moisture content, total soluble solids, acidity and sugars (reducing and total sugars) were estimated as per the standard methods and the values are depicted in Table 1.

Table 1. Chemical composition of banana pulp

Chemical constituent	Quantity*
Moisture content (%)	72.73
Total soluble solids (°B)	20.7
Titratable acidity (%)	0.26
Reducing sugars (%)	9.8
Total sugars (%)	16.4

*Values are the means of three observations

The moisture content of ripe banana pulp was 72.73 per cent, total soluble solids were 20.7°B and the titratable acidity was 0.26 per cent. The reducing sugar and total sugar contents were 9.8 and 16.4 per cent respectively.

RESULTS and DISCUSSION

Chemical parameters of banana Pedha as influenced by different treatments of pulp content and storage period are depicted in Table 2.

Moisture: Minimum moisture content was in the treatment having 100 g banana pulp (5.02%) which was on par with treatment having 150 g pulp (5.70%). The treatment with 300 g banana pulp exhibited maximum (7.57%) mean moisture content. Thus it was observed that the moisture content of Pedha increased with increase in the level of banana pulp. The storage period also exhibited a significant impact on the moisture content of banana Pedha. The lowest (5.22%) mean moisture content was noticed at 0 day of storage which was on par with 5 days storage. Highest (7.93%) moisture content was found in 15 days of storage at ambient condition. Thus the moisture content increased significantly with increase in storage period. The interaction effect between treatments and the storage period was found statistically non-significant.

Significant increase in moisture content was observed during storage in banana Pedha irrespective of the treatments. The gain in moisture might be due to absorption of moisture from the atmosphere by the package at ambient conditions or it might be due to chemical changes such as browning reactions that took place in product during storage. Similar trend of increase in moisture during storage has been recorded by Mir and Nath (1993) in fortified mango bar, Ukkuru and Pandey (2007) in jackfruit bar, Sharma et al (2006) in protein rich compressed bar, Khadtar (2012) in jackfruit bar, More (2015) in mango Pedha and Surve (2016) in guava Pedha.

Total soluble solids: There was an increase in the TSS during storage of banana Pedha irrespective of the treatments with different levels of banana pulp. The maximum TSS (76.50°B) was recorded in the treatment with 300 g pulp over rest of the treatments studied and the least (68.23°B) was recorded in the treatment with 100 g pulp. It was highest (74.85°B) under 15 days storage as compared to rest of the treatments. The interaction effect of treatments and storage period was non-significant. Thus the mean TSS content of the banana Pedha increased with the advancement of the storage period. Similar trend of increase in TSS during storage has been recorded by Gayathri and Uthira (2008) in mango and papaya blended fruit bars and Khadtar (2012) in jackfruit bar.

Titratable acidity: The treatment with 100 g banana pulp showed minimum (0.46%) and with 300 g exhibited maximum (0.53%) titratable acidity. Thus the acidity of the banana Pedha increased with increase in the level of banana pulp. The lowest (0.47%) mean acidity was observed at the initial day of the storage and it was highest (0.52%) under 15 days of storage under ambient conditions. The highest (0.60%) acidity was recorded in case of 300 g banana pulp at 15 days of storage. Similar trend of increase in acidity during storage has been recorded by Mir and Nath (1993) in fortified mango bar, Aruna et al (1999) in papaya fruit bar and Vennilla (2004) in guava-papaya fruit bar.

Reducing sugars: Reducing sugars were maximum in 300 g banana pulp treatment (9.33%) and minimum (7.63%) in the treatment having 100 g banana pulp. The reducing sugar content increased significantly from

Table 2. Chemical parameters of banana Pedha as influenced by different treatments of pulp content and storage period

Treatment	Moisture (%)	TSS (°B)	Acidity (%)	Reducing sugar (%)	Total sugar (%)
Pulp (%)					
P_1	5.02	68.23	0.46	7.63	46.05
P_2	5.70	71.49	0.48	8.54	50.53
P_3	6.35	72.50	0.49	8.75	53.25
P_4	6.80	73.80	0.50	9.00	58.23
P_5	7.57	76.50	0.53	9.33	60.55
SE±	0.30	00.39	0.004	0.08	0.74
$CD_{0.05}$	0.88	01.11	0.012	0.23	2.14
Storage period					
S_1	5.22	70.40	0.47	8.15	50.79
S_2	5.73	71.81	0.48	8.33	53.81
S_3	6.27	72.95	0.49	8.91	54.40
S_4	7.93	74.85	0.52	9.20	55.89
SE±	0.34	00.43	0.005	0.09	0.83
$CD_{0.05}$	0.98	01.24	0.013	0.25	2.39
Pulp x Storage period					
$P_1 \times S_1$	4.23	64.67	0.43	6.87	43.72
$P_1 \times S_2$	4.74	68.86	0.44	7.20	46.18
$P_1 \times S_3$	5.29	69.20	0.47	7.76	46.64
$P_1 \times S_4$	5.82	70.27	0.48	8.67	47.66
$P_2 \times S_1$	5.16	69.8	0.45	8.16	44.02
$P_2 \times S_2$	5.39	70.66	0.47	8.40	51.91
$P_2 \times S_3$	5.78	71.83	0.48	8.73	52.40
$P_2 \times S_4$	6.48	73.60	0.50	8.86	53.79
$P_3 \times S_1$	5.24	70.93	0.47	8.30	50.30
$P_3 \times S_2$	5.96	71.20	0.48	8.57	52.54
$P_3 \times S_3$	6.55	72.13	0.49	9.00	54.04
$P_3 \times S_4$	7.67	75.73	0.52	9.10	56.11
$P_4 \times S_1$	5.56	71.47	0.48	8.57	56.72
$P_4 \times S_2$	6.23	72.67	0.49	8.60	58.29
$P_4 \times S_3$	6.72	74.80	0.50	9.33	58.39
$P_4 \times S_4$	8.68	76.27	0.53	9.50	59.53
$P_5 \times S_1$	5.89	75.06	0.49	8.86	59.22
$P_5 \times S_2$	6.33	75.73	0.51	8.90	60.12
$P_5 \times S_3$	7.02	76.80	0.52	9.70	60.50
$P_5 \times S_4$	11.03	78.40	0.60	9.87	62.37
SE±	0.69	0.87	0.009	0.18	01.67
$CD_{0.05}$	NS	NS	0.027	NS	NS

T_1: 100 g, T_2: 150 g, T_3: 200 g, T_4: 250 g, T_5: 300 g banana pulp; S_1: Initial (0 day), S_2: 5 days, S_3: 10 days and S_4: 15 days storage at ambient conditions

initial 8.15 per cent to as high as 9.20 per cent after 15 days of storage at ambient conditions. The interaction effect of treatments and storage period showed a statistically non-significant effect. The increase in reducing sugars of banana Pedha during storage could be due to acid hydrolysis of sucrose during storage. Similar trend of increase in reducing sugars during storage has been recorded by Mir and Nath (1993) in fortified mango bar, Aruna et al (1999) in papaya bar, Vennilla (2004) in guava-papaya fruit bar, Khadtar (2012) in jackfruit bar, Kohale and Rokhade in sapota Burfi (2012) and More (2015) in mango Pedha.

Total sugars: The total sugar content in banana Pedha was minimum in the treatment with 100 g banana pulp (46.05%) while with 300 g recorded maximum (60.55%). The lowest total sugar content (50.79%) was observed at the 0 day of storage and the highest (55.89%) at 15 days of storage. The interaction between treatments and storage showed statistically

non-significant variation. The increase in total sugars was probably due to hydrolysis of non-reducing sugars during storage. Similar trend of increase in total sugars during storage has been recorded by Ukkuru and Pandey (2007) and Khadtar (2012) in jackfruit bar and Kohale and Rokhade (2012) in sapota Burfi.

REFERENCES

Anonymous 1975. Official methods of analysis. 2nd edn, Association of Official Analytical Chemists, Washington, DC.

Aruna K, Vimala V, Dhanalaxmi K and Reddy V 1999. Physico-chemical changes during storage of papaya fruit (*Carica papaya* L) bar (Thandra). Journal of Food Science and Technology **36(5):** 425-433.

Chanbisana C and Banik AK 2014. Studies on preparation of puree from ripe banana. Journal of Environmental Research and Development **9(1):** 224-231.

Gayathri S and Uthira L 2008. Preparation and evaluation of protein enriched mango-papaya blended fruit bar. Beverage and Food World **35:** 56-57.

Gopalan C, Rama Sastri BV and Balasubramanian SC 2004. Nutritive value of Indian foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, Andhra Pradesh, India.

Khadtar PP 2012. Studies on standardization of jackfruit (*Artocarpus heterophyllus* L) bar. MSc Thesis, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India.

Kohale V and Rokhade AK 2012. Studies on preparation of sapota Burfi. Bioinfolet **9(3):** 336-340.

Landge VV, Pawar BR, Yeware PP and Deshmukh DS 2010. Preference for banana products and their effects on consumer's satisfaction. Agriculture Update **5(1-2):** 142-144.

Mir MA and Nath N 1993. Storage changes in fortified mango bars. Journal of Food Science and Technology **30(4):** 279-282.

More PA 2015. Studies on preparation of mango Pedha from frozen Alphonso mango (*Mangifera indica* L). MSc Thesis, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India.

More PD 2014. Studies on preparation of sapota, *Manilkara achras* (Mill) Foseberg Pedha. MSc Thesis, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India.

Ranganna S 1986. Handbook of analysis and quality control for fruit and vegetable products. 2nd edn, Tata McGraw-Hill Publishing Co Ltd, New Delhi, India.

Sharma GK, Padmashree A, Roopa N and Bawa AS 2006. Storage stability of protein rich compressed bar. Journal of Food Science and Technology **43:** 404-406.

Surve S 2016. Studies on standardization of guava (*Psidium guajava* L) Pedha. MSc Thesis, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India.

Ukkuru PM and Pandey S 2007. Fruit bars with jackfruit bulbs. Beverage and Food World **34(9):** 71-72.

Vennilla P 2004. Studies on storage behaviour of guava-papaya bar. Beverage and Food World **31(2):** 63-66.