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Sensory evaluation and microbial analysis of rose petal jam

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Abstract

An experiment was conducted at the Horticulture Department, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur (Raj.) during August, 2017 to January 2018 to analyze sensory evaluation and microbial count of rose petal jam during storage. The rose petal jam combination were studied at monthly interval up to 90 days storage duration. All sensory characters were found decreasing during storage. The rose petal jam treatment combination T₃ - rose petal + sugar (1:1.25w/w) was found best having higher score pertaining to colour, texture and overall acceptability except flavour and taste which was found best in treatment combination T₁ - rose petal + sugar (1:0.75w/w). In respect to microbial count minimum fungal and bacterial growth (1.00 cfu X 10⁴ g⁻¹ and 1.00 cfu X 10⁶ g⁻¹ respectively) were recorded in treatment combination T₃ - rose petal + sugar (1:1.25w/w) at 90 days of storage.

Keywords: Rose petal jam, microbial count, sensory score

Introduction

Rose is a beautiful creation in nature and is universally acclaimed as the “Queen of Flowers”. In floriculture, rose is foremost commercially important as cut roses, loose flower and value added products, which have high demand throughout the world year round. Rose belongs to family Rosaceae. *Rosa hybrida* contains diploid chromosome number 2n=14. Rose possess different characters required for cut flowers such as more number of petals, slow opening of bud, more longevity and attractive colours. Roses are hardy and can withstand stress of unfavourable weather conditions.

About 75 percent of this produce is exported to West-Asian countries in the form of petals, ascertaining the importance of rose for it's by products. Among the various varieties, damask rose (*Rosa damascena* Mill.) is the most important rose species used to produce rose oil, water, gulkand, concrete and absolute which are valuable and important base materials for the perfume and cosmetic industry (Ayci *et al.* 2005) [3]. Rose finds its application in food, medicinal and cosmetic industry. Rose is a highly nutritive flower with a high content of vitamin-C, carotenoids, phenolic components, some mineral and essential oil. Rose petals have been consumed for many years in cakes, teas and flavor extracts (Mabellini *et al.* 2011) [8]. Rose value added products are rich in antioxidants, used as astringent, tonic, mild laxative, antibacterial agent, treatment of sore throat, enlarged tonsils, cardiac troubles, eye disease, gall stones anti-HIV, anti-bacterial and hypnotic activities (Agrawal and Kaur, 2017) [1]. Rose processed products could be utilized in the food industry as a source of natural pigments such as anthocyanins due to their attractive color, antioxidant properties which improved human health.

In India rose is grown in an area of 30.87 million hectares with an annual production 212.67 thousand MT. The major rose growing states in our country are Karnataka, Gujarat, Andhra Pradesh, Orissa, Uttar Pradesh, Madhya Pradesh, Maharashtra, Assam, Chattisgarh and Haryana. Gulkand or rose petal jam is one of the most delicious ayurvedic preparations which has been used from ancient times for good health. The National Institute of Ayurvedic Medicine provides a list of the benefits obtained by consuming gulkand on a regular basis. It has been traditionally used as a cooling tonic to fight fatigue, lethargy, hyperacidity, dysmenorrhoea, fluid retention and heat-related conditions. It is also good for memory and used as good blood purifier (AYUSHVEDA). Gulkand is considered both as a tonic and laxative (Pal, 1972; Rode and Ogale, 1984) [9, 14]. *Rosa damascena*, *R. chinensis*, *R. gallica*, *R. pomifera*, *R. centifolia* and *R. bourboniana* are used for preparing gulkand.

Gulkand is a powerful antioxidant and a very good rejuvenator. Consuming 1-2 teaspoons of gulkand helps to reduce acidity and stomach heat.

At present scanty research work is available on sensory evaluation and microbial analysis of rose petal jam. Keeping these in view, a study was conducted to observe the changes in sensory parameter and microbial analysis of rose petal jam during storage.

Materials and Methods

The experiment was carried out in processing laboratory at Department of Horticulture, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan. The experiment was laid out in completely randomized design with twelve treatment combinations of rose petal jam replicated thrice. The treatment details are as below:

T ₁	=	Rose Petal + Sugar (1:0.75w/w)
T ₂	=	Rose Petal + Sugar (1:1w/w)
T ₃	=	Rose Petal + Sugar (1:1.25w/w)
T ₄	=	Rose Petal + Honey (1:0.75w/w)
T ₅	=	Rose Petal + Honey (1:1w/w)
T ₆	=	Rose Petal + Honey (1:1.25w/w)
T ₇	=	Rose Petal + Sugar Candy (1:0.75w/w)
T ₈	=	Rose Petal + Sugar Candy (1:1w/w)
T ₉	=	Rose Petal + Sugar Candy (1:1.25w/w)
T ₁₀	=	Rose Petal + Jaggery (1:0.75w/w)
T ₁₁	=	Rose Petal + Jaggery (1:1w/w)
T ₁₂	=	Rose Petal + Jaggery (1:1.25w/w)

Fresh rose flower petals were used for the preparation of gulkand. The calculated quantities of petals either with sugar, jaggery, sugar candy and honey as per treatment were arranged in alternate layers in a wide mouth glass jar. The mouth of gulkand jar was covered and tied with muslin cloth, after that placed in sun light for impregnation of sugar, honey, sugar candy and jaggery into petals up to 30 days. They were then labeled and stored under ambient condition for 0, 30, 60 and 90 days observations. The sensory parameters viz; colour, texture, taste, flavour and overall acceptability based on 9 point hedonic scale (Amerine *et al.*, 1965) [2]. Numbers of bacteria were counted by using Thornton's medium and fungi were counted by using martin's Rose-Bengal medium. The data were analysed by using completely randomized design (Fisher, 1950) [5].

Result and discussion

Organoleptic rating

The organoleptic rating of rose petal jam was decreased with the advancement of storage duration. The overall value of colour, taste, flavour and texture of rose petal jam was observed during storage.

Colour: An examination of data presented in Table 1 shows that there has been a significant decline in colour acceptance score of rose petal jam during storage. Maximum colour value was recorded from treatment T₃-rose petal + sugar (1:1.25w/w) and lowest in T₁₀ - rose petal + jaggery (1:0.75w/w) at the end of storage days. The reduction in colour scores might be due to maillard reaction accelerated during storage. Rose petals are rich in tannin and red pigments are highly sensitive to oxygen and enzyme leads to oxidation and enzymatic browning causing discolouration of

product during processing under direct sunrays and prolong storage at ambient condition. Similar results have also been reported by Koli *et al.* (2004) [7] in sapota jam, Sravanan *et al.* (2004) [15] in papaya jam, Prasad and Mali (2005) [11] in bael jam and Shakir *et al.* (2009) [16] in apple pear mixed fruit jam.

Flavour: An examination of data presented in Table 1 shows that the highest flavour trend was recorded from treatment T₁ - rose petal + sugar (1:0.75w/w) followed by T₃-rose petal + sugar (1:1.25w/w) while lowest flavour trend was in T₅ - rose petal + honey (1:1). The reduction in flavour value is due to the loss of highly volatile aromatic compound which is very sensitive to high storage temperature as well as enzymatic degradation of phenols and oxidative changes of sugars are take place which is responsible for loss of flavour during storage. Present findings were in accordance with Priya *et al.* (2010) [12] in mixed fruit jam, Relekar *et al.* (2011) [13] in sapota jam, Patel *et al.* (2015) [10] banana – pineapple blended jam.

Taste: An examination of data presented in Table 2 shows that the maximum taste value (8.25) was recorded from treatment from treatment T₁ - rose petal + sugar (1:0.75w/w) followed by T₃-rose petal + sugar (1:1.25w/w). It has showed decreasing trend during the storage period due to the adverse effect of atmospheric moisture and the biochemical changes during storage. These findings are in accordance with Priya *et al.* (2010) [12] in mixed fruit jam, Relekar *et al.* (2011) [13] in sapota jam and Patel *et al.* (2015) [10] banana – pineapple blended jam.

Texture: It is clear from the data indicated in Table 2 that the texture value of rose petal jam decreased with the advancement of storage duration. The maximum texture value (8.83) was recorded from treatment T₃-rose petal + sugar (1:1.25w/w) followed by T₂ - rose petal + sugar (1:1w/w) and minimum (4.89) was in T₁₀ - rose petal + jaggery (1:0.75w/w) at 90 days of storage duration. This could be due to the adverse effect of atmospheric moisture and the biochemical changes during storage. Similar observations were found by Priya *et al.* (2010) [12] in mixed fruit jam and Relekar *et al.* (2011) [13] in sapota jam.

Overall acceptability: Data presented in Table 3 shows that the overall acceptability value of rose petal jam decreased with the advancement of storage duration. The decline in overall acceptability of the product might be due to probable degradation of colour, flavor, taste and texture. Maximum overall acceptability score was recorded from treatment T₃-rose petal + sugar (1:1.25w/w) and lowest in T₁₀ - rose petal + jaggery (1:0.75). Such identical findings were also observed by Priya *et al.* (2010) [12] in mixed fruit jam, Relekar *et al.* (2011) [13] in sapota jam and Patel *et al.* (2015) [10] banana – pineapple blended jam.

Microbial count

The microbial count was affected by different treatment combination. Number of colony was increased with advancement of storage duration.

Fungal growth (cfu X 10⁴ g⁻¹): The data presented in Table 4 shows that the total viable fungi count revealed insignificant increase during storage duration. No detectable yeast and moulds observed upto 30 days of storage duration. the

minimum fungal growth ($1.00 \text{ cfu} \times 10^4 \text{ g}^{-1}$) was recorded from treatment T₂ - rose petal + sugar (1:1w/w), T₃-rose petal + sugar (1:1.25w/w), T₆ - rose petal + honey (1:1.25w/w), T₇-rose petal + sugar candy (1:0.75w/w), T₉ - rose petal + sugar candy (1:1.25w/w) and T₁₂ - rose petal + jaggery (1:1.25w/w) at 90 days storage duration. The higher level of sugar in solution exerted an osmotic pressure, which helped in keeping away osmophilic loads in the rose petal jam. Similar results have also been reported by in apple and pear mixed fruit jam, Bafna and Manimehalai (2013) [4] in kokum jam.

Bacterial growth ($\text{cfu} \times 10^6 \text{ g}^{-1}$): The data presented in Table 4 shows that number of bacterial colony was increased with the advancement of storage duration. Initially there were no viable bacterial growth observed upto 30 days of storage duration on improved level of various ingredients in rose petal

jam. Whereas minimum number of colony was recorded in treatment T₂, T₃, T₇ and T₉ ($1.00 \text{ cfu} \times 10^4 \text{ g}^{-1}$) while maximum in treatment T₁₀ and T₁₁ ($4.00 \text{ cfu} \times 10^6 \text{ g}^{-1}$) at 90 days of storage duration. The limited bacterial growth observed at later stage of storage might be due to increase in the content of sugar and titratable acidity of products because sugar and higher acid possess preservative properties to reduce the microbial growth. Present findings are supported by Goyal and Ojha (1998) [6] in orange juice and in apple and pear mixed fruit jam.

On the basis of study it is concluded that The rose petal jam treatment combination T₃ - rose petal + sugar (1:1.25w/w) was found best over the rest treatments with respect to sensory qualities i.e. colour and overall acceptability (8.26) with least increase in microbial count (fungus and bacteria) upto 90 days of storage duration.

Table 1: Effect of ingredient combination on colour and flavour of rose petal jam during ambient storage

Treatments (w/w)	Storage duration (days)									
	Colour					Flavour				
	0	30	60	90	Mean	0	30	60	90	Mean
T ₁ – Rose Petal + Sugar (1:0.75)	8.02	7.85	7.68	7.52	7.77	8.82	8.63	8.45	8.26	8.54
T ₂ – Rose Petal + Sugar (1:1)	8.04	7.87	7.70	7.53	7.79	8.57	8.39	8.21	8.03	8.30
T ₃ – Rose Petal + Sugar (1:1.25)	8.35	8.17	8.00	7.82	8.09	8.76	8.57	8.39	8.21	8.48
T ₄ – Rose Petal + Honey (1:0.75)	5.08	4.97	4.86	4.76	4.92	4.50	4.40	4.31	4.22	4.36
T ₅ – Rose Petal + Honey (1:1)	5.20	5.09	4.98	4.87	5.04	4.48	4.38	4.29	4.20	4.34
T ₆ – Rose Petal + Honey (1:1.25)	5.44	5.32	5.21	5.10	5.27	4.56	4.46	4.37	4.27	4.42
T ₇ – Rose Petal + Sugar Candy (1:0.75)	8.04	7.87	7.70	7.53	7.79	6.87	6.72	6.58	6.44	6.65
T ₈ – Rose Petal + Sugar Candy (1:1)	8.18	8.00	7.83	7.67	7.92	7.04	6.89	6.74	6.60	6.82
T ₉ – Rose Petal + Sugar Candy (1:1.25)	8.26	8.08	7.91	7.74	8.00	7.12	6.97	6.82	6.67	6.90
T ₁₀ – Rose Petal + Jaggery (1:0.75)	4.16	4.07	3.98	3.90	4.03	4.52	4.42	4.33	4.24	4.38
T ₁₁ – Rose Petal + Jaggery (1:1)	4.22	4.13	4.04	3.95	4.09	4.82	4.72	4.62	4.52	4.67
T ₁₂ – Rose Petal + Jaggery (1:1.25)	4.62	4.52	4.42	4.33	4.47	4.76	4.66	4.56	4.46	4.61
SEm±	0.11	0.12	0.11	0.10		0.18	0.17	0.17	0.16	
C.D. (P=0.05)	0.38	0.40	0.36	0.36		0.60	0.59	0.58	0.56	

Table 2: Effect of ingredient combination on taste and texture of rose petal jam during ambient storage

Treatments (w/w)	Storage duration (days)									
	Taste					Texture				
	0	30	60	90	Mean	0	30	60	90	Mean
T ₁ – Rose Petal + Sugar (1:0.75)	8.80	8.61	8.43	8.25	8.52	9.28	9.08	8.89	8.70	8.99
T ₂ – Rose Petal + Sugar (1:1)	8.54	8.36	8.18	8.00	8.27	9.36	9.16	8.96	8.77	9.06
T ₃ – Rose Petal + Sugar (1:1.25)	8.76	8.57	8.39	8.21	8.48	9.42	9.22	9.02	8.83	9.12
T ₄ – Rose Petal + Honey (1:0.75)	3.76	3.68	3.60	3.52	3.64	6.12	5.99	5.86	5.73	5.93
T ₅ – Rose Petal + Honey (1:1)	3.86	3.78	3.70	3.62	3.74	6.28	6.15	6.01	5.88	6.08
T ₆ – Rose Petal + Honey (1:1.25)	3.84	3.76	3.68	3.60	3.72	6.20	6.07	5.94	5.81	6.01
T ₇ – Rose Petal + Sugar Candy (1:0.75)	8.05	7.88	7.71	7.54	7.80	8.44	8.26	8.08	7.91	8.17
T ₈ – Rose Petal + Sugar Candy (1:1)	8.20	8.02	7.85	7.68	7.94	8.60	8.42	8.24	8.06	8.33
T ₉ – Rose Petal + Sugar Candy (1:1.25)	8.36	8.18	8.01	7.83	8.10	8.52	8.34	8.16	7.98	8.25
T ₁₀ – Rose Petal + Jaggery (1:0.75)	3.42	3.35	3.27	3.20	3.31	5.22	5.11	5.00	4.89	5.06
T ₁₁ – Rose Petal + Jaggery (1:1)	3.48	3.41	3.33	3.26	3.37	5.26	5.15	5.04	4.93	5.10
T ₁₂ – Rose Petal + Jaggery (1:1.25)	3.52	3.44	3.37	3.30	3.41	5.32	5.21	5.09	4.99	5.15
SEm±	0.18	0.18	0.17	0.16		0.13	0.12	0.12	0.11	
C.D. (P=0.05)	0.61	0.60	0.59	0.57		0.43	0.43	0.42	0.41	

Table 3: Effect of ingredient combination on overall acceptability of rose petal jam during ambient storage

Treatments (w/w)	Storage duration (days)				
	0	30	60	90	Mean
T ₁ – Rose Petal + Sugar (1:0.75)	8.73	8.54	8.36	8.18	8.99
T ₂ – Rose Petal + Sugar (1:1)	8.62	8.44	8.25	8.08	9.06
T ₃ – Rose Petal + Sugar (1:1.25)	8.82	8.63	8.45	8.26	9.12
T ₄ – Rose Petal + Honey (1:0.75)	4.86	4.76	4.65	4.55	5.93
T ₅ – Rose Petal + Honey (1:1)	4.95	4.84	4.74	4.64	6.08
T ₆ – Rose Petal + Honey (1:1.25)	5.01	4.90	4.80	4.69	6.01
T ₇ – Rose Petal + Sugar Candy (1:0.75)	7.85	7.68	7.52	7.36	8.17
T ₈ – Rose Petal + Sugar Candy (1:1)	8.00	7.83	7.66	7.50	8.33
T ₉ – Rose Petal + Sugar Candy (1:1.25)	8.06	7.89	7.72	7.55	8.25
T ₁₀ – Rose Petal + Jaggery (1:0.75)	4.33	4.24	4.15	4.06	5.06
T ₁₁ – Rose Petal + Jaggery (1:1)	4.44	4.34	4.25	4.16	5.10
T ₁₂ – Rose Petal + Jaggery (1:1.25)	4.55	4.45	4.36	4.26	5.15
SEm±	0.19	0.18	0.18	0.17	
C.D. (P=0.05)	0.63	0.62	0.61	0.60	

Table 4: Effect of ingredient combination on microbial count of rose petal jam during ambient storage

Treatments (w/w)	Storage duration (days)									
	fungal growth (cfu × 10 ⁴ g ⁻¹)					bacterial growth (cfu × 10 ⁶ g ⁻¹)				
	0	30	60	90	Mean	0	30	60	90	Mean
T ₁ – Rose Petal + Sugar (1:0.75)	0.00	0.00	1.00	2.00	0.75	0.00	0.00	1.00	2.00	0.75
T ₂ – Rose Petal + Sugar (1:1)	0.00	0.00	1.00	1.00	0.50	0.00	0.00	1.00	1.00	0.50
T ₃ – Rose Petal + Sugar (1:1.25)	0.00	0.00	0.00	1.00	0.25	0.00	0.00	1.00	1.00	0.50
T ₄ – Rose Petal + Honey (1:0.75)	0.00	0.00	1.00	2.00	0.75	0.00	0.00	1.00	2.00	0.75
T ₅ – Rose Petal + Honey (1:1)	0.00	0.00	2.00	2.00	1.00	0.00	0.00	0.00	2.00	0.50
T ₆ – Rose Petal + Honey (1:1.25)	0.00	0.00	1.00	1.00	0.50	0.00	0.00	1.00	2.00	0.75
T ₇ – Rose Petal + Sugar Candy (1:0.75)	0.00	0.00	1.00	1.00	0.50	0.00	0.00	1.00	1.00	0.50
T ₈ – Rose Petal + Sugar Candy (1:1)	0.00	0.00	1.00	2.00	0.75	0.00	0.00	2.00	2.00	1.00
T ₉ – Rose Petal + Sugar Candy (1:1.25)	0.00	0.00	0.00	1.00	0.25	0.00	0.00	1.00	1.00	0.50
T ₁₀ – Rose Petal + Jaggery (1:0.75)	0.00	0.00	2.00	4.00	1.50	0.00	0.00	2.00	4.00	1.50
T ₁₁ – Rose Petal + Jaggery (1:1)	0.00	0.00	1.00	2.00	0.75	0.00	0.00	2.00	4.00	1.50
T ₁₂ – Rose Petal + Jaggery (1:1.25)	0.00	0.00	1.00	1.00	0.50	0.00	0.00	1.00	2.00	0.75
SEm±	0.00	0.00	0.03	0.05		0.00	0.00	0.02	0.03	
C.D. (P=0.05)	NS	NS	0.10	0.17		NS	NS	0.06	0.11	

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