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Formulation, standardization and shelf-life evaluation of *Rosa damascena* sharbat using lime juice as natural preservative in different concentrations

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Abstract

Rosa damascena is a flower with deep red colored variety with a sweet fragrance and it has been used traditionally in different food preparations. An experiment was conducted at the Krishi Vigyan Kendra, Tirunelveli during the period January 2020 to January 2021 to establish a standard method of preparation, optimum level of natural preservative required and to study the shelf-life using sensory evaluation scores. The recipe for rose petal (indigenous *Rosa damascene*) sharbat preparation method was formulated and standardized without adding any artificial preservatives. Lime juice, which contains citric acid, was added as natural preservative at different concentrations of 1%, 2% and 3%. The acceptability responses of the semi panelists were encouraged for a period of 180 days at 60 days interval. Accordingly, by sensory evaluation it was found that the product *Rosa damascena* sharbat was acceptable till a storage period of 180 days in room temperature. The *Rosa damascene* petals can be very well utilized for preparation of sharbat and the product scored well in the experiment. As it is a good rejuvenator and antioxidant to revitalize general health, it will be ideal to include this herb in our daily diet in the form of syrup.

Keywords: *Rosa damascena* sharbat, natural preservative, shelf life study, sensory evaluation

Introduction

Rosa damascenes Mill. is a beautiful nature creation and it is universally highly praised as the “Queen of Flowers”. Edible petals of *Rosa damascene* have been recognized since ancient times for their food and medicinal values. Presently, in terms of profit making, the Floriculture is considered as the most lucrative agro enterprise. As the perishable and deteriorating nature of the fresh flowers poses a problem for the common farmers to realise its true potential, they need to be trained to follow standard post-harvest management practices. Even traditionally people strived to improve the aesthetic appearance, taste, aroma and value of the product. On a commercial level it is essential to have a standard product that is optimized to its value and consistency. Hence, value addition by the Argo-industries is another important arena for proper utilization of fresh ornamentals in either garden-fresh or processed form. Different kinds of value-added products are nowadays formulated and marketed by several companies. The existing rose products like rose water, rose syrup, rose jam, rose lassi (sour milk), rose ice-cream etc. available in the market, mostly use synthetic colour and flavor. Using such synthetic agents is inadvisable as they could be carcinogenic. For this reason, food and medical industries are increasingly interested in natural and harmless agents with therapeutic and nutritional benefits.

Literature Review

Edible flowers of *Rosa damascena* are emerging as new source of nutraceuticals due to their nutritional and medicinal value (Mlcek and Rop, 2011) [1]. Edible flowers have been used traditionally to improve the aesthetic appearance, taste, aroma and value of the foodstuffs. *Rosa damascena* flowers have been used for food and medicinal purpose since ancient time (Kaisoon *et al.* 2012) [2]. Many species of rose (*Rosa* spp.) were used in ancient Greece and Rome as relishes and flavour enhancers of many sweet and savoury dishes while in the Indian Ayurveda system, various rose preparations were used as tonic, astringent, laxative and antibacterial agent (Verma *et al.* 2011) [3]. *Rosa damascena* petals are used as a cooling agent and as a vehicle for many Ayurvedic medicines (Kaul, 1998) [4]. In European countries, the flowers are generally used for preparation of hot beverages (tisane or infusion) like tea and a

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great advantage is that they are free from caffeine (Navarro-González *et al.* 2015) ^[5]. *Rosa damascena* petals were preserved in the form of Gulkand (rose petals preserve) or fragrant syrup known as Gulkand Sharbat (Kumar *et al.* 2017) ^[6]. *Rosa damascena* finds its application in food, medicinal and cosmetic industry. *Rosa damascena* is a highly nutritive flower with a high content of Vitamin C, carotenoids (Vitamin A precursors), phenolic components, some mineral and essential oil (Mabellini A, Ohaco E, *et al.*, 2011) ^[7]. *Rosa damascena* petals have been consumed for many years in cakes, teas and flavor extracts (Lee JH, Lee HJ, Choung MG. 2011) ^[8].

According to Poonam Aggarwal and Sukhpreet Kaur 2017 ^[9], Rose by-product of *Rosa damascena* is widely used as skin cooling and cleaning agent. The dried rose petals are used for skin care and the preparation of Gul-e-Rohgan for making hair oils as well. Hence, value addition by the Argo-industries is another important arena for proper utilization of fresh ornamentals in either garden-fresh or processed form. Different kinds of value-added products are nowadays formulated and marketed by several companies. The existing rose products available in the market are mostly with synthetic colour and flavor like rose water, rose syrup, rose jam, rose lassi (sour milk), rose ice-cream and sweets with rose.

These synthetic colors and flavors are sometimes carcinogenic and may cause allergens. For this reason, food and medical industries are increasingly interested in natural sources with high anthocyanin contents for manufacture of supplements with therapeutic and nutritional uses. *Rosa damascena* preparations could be applied in the food industry as a good source of natural pigments such as anthocyanins due to its attractive color and valuable health benefits and antioxidant activities. Therefore, the present study was carried out for the purpose of extraction and utilization of rose preparations in the form of sharbat in order to gain the health benefits.

Objectives

The following are the specific objectives of the study

1. To formulate the recipe and standardize the preparation of the indigenous *Rosa damascena* sharbat for commercial purpose using lime juice as natural preservative for the benefit of small farmers engaged in agro-enterprises.
2. To evaluate the efficacy of three different levels viz., 1%, 2% and 3% of lime juice as natural preservative and recommend the ideal concentration for a desired shelf life of the sharbat.
3. To review the functional and nutraceutical properties of *Rosa damascena* herbs and how *Rosa damascena* herbs are used as alternatives to many diseases

Nutritional Composition

Table 1: Nutritional composition of *Rosa damascena* for 100gms

Mineral	Fresh <i>Rosa damascena</i> -content (per 100g)
Potassium	153.39 mg
Phosphorus	34.59 mg
Calcium	13.78 mg
Copper	1.82 mg
Iron	1.33 mg
Zinc	0.29mg
Sulphur	16.72mg
Sodium	7.61mg
Magnesium	12.75mg

The table 1 above shows the Nutritional composition of *Rosa damascena* as reported by Rop *et al.* (2012) ^[9]. The reported content of potassium, phosphorus, calcium, copper, iron, zinc, sulphur, sodium and magnesium were 153.39 mg, 34.59mg, 13.78 mg, 1.82 mg, 1.33 mg, 0.29 mg, 16.72 mg, 7.61 mg and 12.75 mg respectively per 100 gms of fresh petals. This shows that the fresh petals are a good source of minerals.

Chemical Components

Table 2: Chemical composition of *Rosa damascena* for 100gms

Components	Fresh <i>Rosa Damascena</i> -content (per 100g)
Phenolic compounds	2230 mg GAE
Ascorbic acid	293.37 mg
Anthocyanins	98.64 mg
Radical scavenging activity	83.91%

Rop *et al.* (2012) ^[10] have also reported the chemical composition of fresh *Rosa damascene* which is shown in table 2, 100 gms of fresh petals were shown to have phenolic compounds, ascorbic acid, anthocyanins of 2230 mg GAE, 98.64 mg, 293.37 mg respectively and a free radical scavenging activity 83.91%. These phytochemical compounds are effective antioxidants that help protect body cells from the damages caused by unstable free radicals which are the products of cell metabolism. As such they are of high therapeutic value.

Traditional uses and health Benefits

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. According to Pal, 1972 ^[11] and Rode & Ogale, 1984 ^[12], Gulkand is considered both as a tonic and laxative. *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. Intake of 1-2 teaspoons of gulkand helps to reduce acidity and stomach heat. At present research work is available on sensory evaluation analysis of rose petal Sharbat.

Pharmacological and Medical applications

Several pharmacological properties including anti HIV, antibacterial, antioxidant, antitussive, hypnotic, antidiabetic, and relaxant effect on tracheal chains have been attributed for this plant by Boskabady *et al.* 2011 ^[13]. *Rosa damascena* rose preparations are reported to have antioxidant and health promoting activities. They are used as astringent, tonic, mild laxative, antibacterial agent and in treatment of sore throat, enlarged tonsils, cardiac troubles, eye disease, gall stones and has been reported to have anti-HIV, anti-bacterial and hypnotic activities.

According to Kovacheva *et al.* 2010 ^[14] there is wide usage in cosmetic products for skin aging, wrinkles and sun damage owing to its antioxidant properties of rose essential oil. The main consumers of rose oil and rose concrete are the big cosmetics and perfumery companies.

Materials and Methods

The "Formulation, Standardization and acceptability studies

of sharbat prepared from indigenous *Rosa damascena* was conducted in the ICAR-Krishi Vigyan Kendra-Tirunelveli (Tamil Nadu). A brief description of methodology is presented below:

The methodology includes various materials required for preparation of *Rosa Damascena*, sharbat using lime juice as natural preservative by adding it in different concentration to study the shelf life of the sharbat.

Raw materials

- Fresh rose petals from *Rosa damascene* fresh flowers, collected from the farm of ICAR-KVK-Tirunelveli, Tamil Nadu.
- Sugar
- Water
- Lime juice

The fresh flowers were collected on a clear sunny day after 10am. The fresh petals were separated from the flower and washed in clean tap water. Raw materials i.e. Sugar and lime

were procured from the local market of Surandai, Tirunelveli, Tamil Nadu. *Rosa Damascena* sharbat is made using the aqueous extract of rose petals. Hence the preliminary step in the methodology is the preparation of Rose water extract.

Rose water extracts preparation

Ingredients

- Fresh Rose petals
- Water and
- Lime juice

Preparation of 250 ml of Rose water extract

Take 50gms of cleaned and washed rose petals in a glass jar and add 240 ml of water and 10 ml of lime juice. Leave the contents in the jar at room temperature for 2 days. Stir the mixture occasionally in between. After two days filter the mixture into a container. The filtered liquid is the rose water extract. Citric acid in the lime juice helps to retain the color and fragrance of natural rose.

Table 3: Requirement of raw materials for *Rosa damascena* for 1 lit of Sharbat preparation

S. No.	Ingredients	Quantities
1	Rose water extract + lime juice	250 ml + 10ml
2	Sugar	650gms
3	Water	750ml
4	Lime juice	10ml, 20ml and 30ml respectively

Standardization of preparation method of *Rosa damascena* Sharbat: In the second phase, take three separate containers and mark A, B and C. To each of the containers take 250ml of rosewater extract, add 650gms of sugar and 750ml of water. To the contents of container, add 10 ml of lime juice, container B add 20 ml of lime juice and container C add 30 ml of lime juice. Heat the contents for 45 mins at 70°C (65° Brix). Allow to cool to room temperature, filter

through a clean muslin cloth into clean and sterilized glass bottles and close them airtight. Pasteurize the bottled sharbat and store at room temperature.

The purpose of three different containers is to study three different shelf life extending treatments to arrive at the ideal concentration of lime juice required to produce an acceptable product with a shelf life of 180 days.

Table 4: Treatment with different level of Preservative (lime juice)

Concentration of lime juice	7 days	30 days	90 days	180 days
1%	Slight Fungal development	Moderate Fungal development and change of Colour and flavor	Intensive Fungal development and change of Colour and flavor	Extensive Fungal development and change of Colour and flavor
2%	Slight Fungal development	Moderate Fungal development and change of Colour and flavor	Intensive Fungal development and change of Colour and flavor	Extensive Fungal development and change of Colour and flavor
3%	Acceptable	Acceptable	Acceptable	Acceptable

Table 4. explains the shelf-life extension study of the sharbat using 1, 2 and 3 percent concentration of lime juice as the preservative in three different containers. The ideal level of

lime juice as preservative is found to be 3% for a shelf-life of 180 days.

Table 5: Steps in preparation of *Rosa damascena* sharbat

Steps in preparation of <i>Rosa damascena</i> sharbat	
1	• Separation of fresh rose petals (50 gms)
2	• Washing in clean tap water
3	• Take the rose petals of 50 gms, add water 240 ml and 10 ml of lime juice in the glass jar and close with lid
4	• Keep in room temperature for 2 days
5	• Stir the contents occasionally
6.	• Take a container add 750ml of water, sugar, add 30 ml of lime juice & rosewater extract and subject to heating at 70 °C for 45mins (65° Brix)
7	• Allow to cool and filtration through muslin cloth
8	• Filling into clean glass bottle
9	• Corking and pasteurizing of bottles
10	• Cooled and stored

Preparation of sugar syrup and Bottling

Sugar and lime juice act as natural preservatives to enhance keeping quality of the product. Adding 30 ml of lime juice for clarification of any undesired substance during heating time and to make a clear and transparent sugar syrup. Allow the syrup solution to cool and filter through a muslin cloth. Bottling is done in a sterilized container.

Sensory Evaluation

Sharbat is a sweet and refreshing drink made of fruits or herbs and aromatic plants. Due to a very high sugar content of the sharbat in a sealed condition does not require refrigeration

and can also be stored for longer period at room temperature of 26- 38 °C. The Coded samples of the developed rose sharbat were served to sensory panel members for evaluation after diluting four times with potable water. The acceptability of the prepared *Rosa damascena* sharbat was evaluated using Organoleptic Evaluation with five-point hedonic scale by 25 semi trained panel members. According to Lawless and Heymann (2010) [15], sensory science has been defined as “a scientific method used to evoke, measure, analyze, and interpret those responses to products as perceived through the senses of sight, smell, touch, taste and hearing.”

Table 6: Sensory evaluation score

I. Scale used		II. Sensory evaluation	
5-point Hedonic scale			
Points	Attributes	Evaluate each of these	
5	Excellent	1-Colour & Appearance	
4	Good	2-Aroma	
3	Average	3-Taste	
2	Poor	4-Texture	
1	Very Poor	5-Overall acceptability	

Table 6 describes the Sensory evaluation score of *Rosa damascena* sharbat by using 5 points Hedonic scale and its attributes.

Discussion

Organoleptic Evaluation was done using five-point hedonic scale by semi trained panel members from the product developed from Suvai-KVK, Tirunelveli.

Analysis

Table 7: Mean Sensory Evaluation results

Mean Sensory Evaluation results					
Evaluation Intervals	Colour & Appearance	Aroma	Taste	Texture	Overall acceptability
0 Day	5	5	5	5.0	5
60 Days	4.9	4.9	5	5.0	4.9
120 Days	4.8	4.8	4.9	5.0	4.8
180 Days	4.8	4.7	4.8	4.9	4.7

Rosa damascena Sharbat from Suvai-KVK was evaluated

Table 7 depicted the mean sensory evaluation results of Suvai-KVK – *Rosa damascena* sharbat.

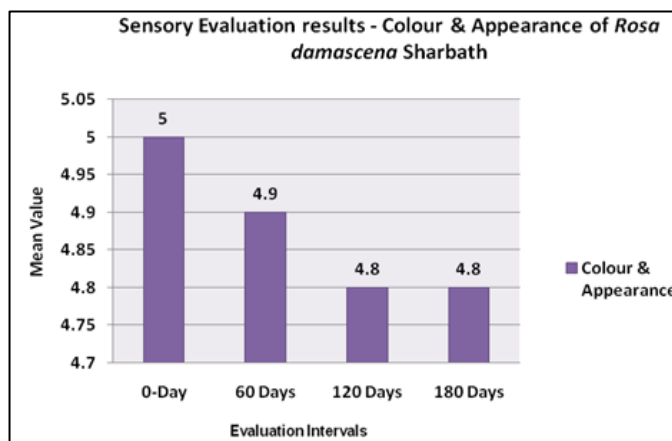


Fig 1: Mean Sensory Evaluation results - Colour & Appearance of *Rosa damascena* Sharbat

In figure 1, the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 180 day with respect to the colour and appearance is illustrated in a bar graph. The results were encouraging in the sense that, the product scored good, mainly due to retaining its natural colour & appearance.

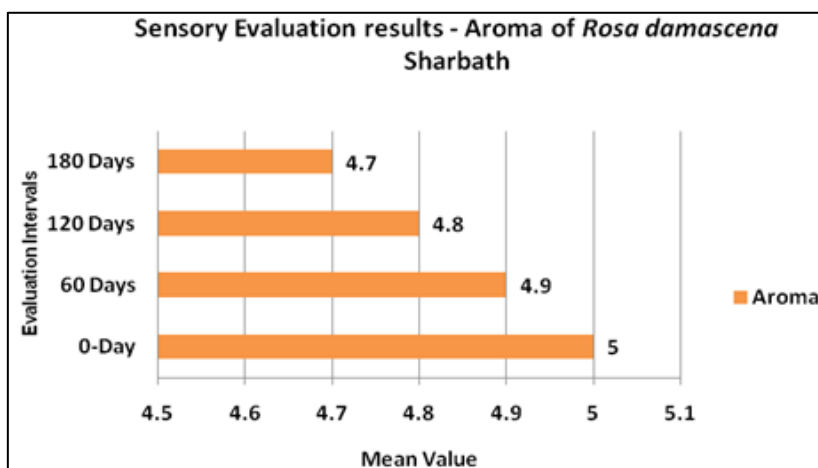


Fig 2: Mean Sensory Evaluation results - Aroma of *Rosa damascena* Sharbat

In figure 2, the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 180 days with respect to the aroma of the product is illustrated

in a bar graph. The results were very encouraging, and the product scored good, due to its ability to retain the original aroma throughout the period of evaluation.

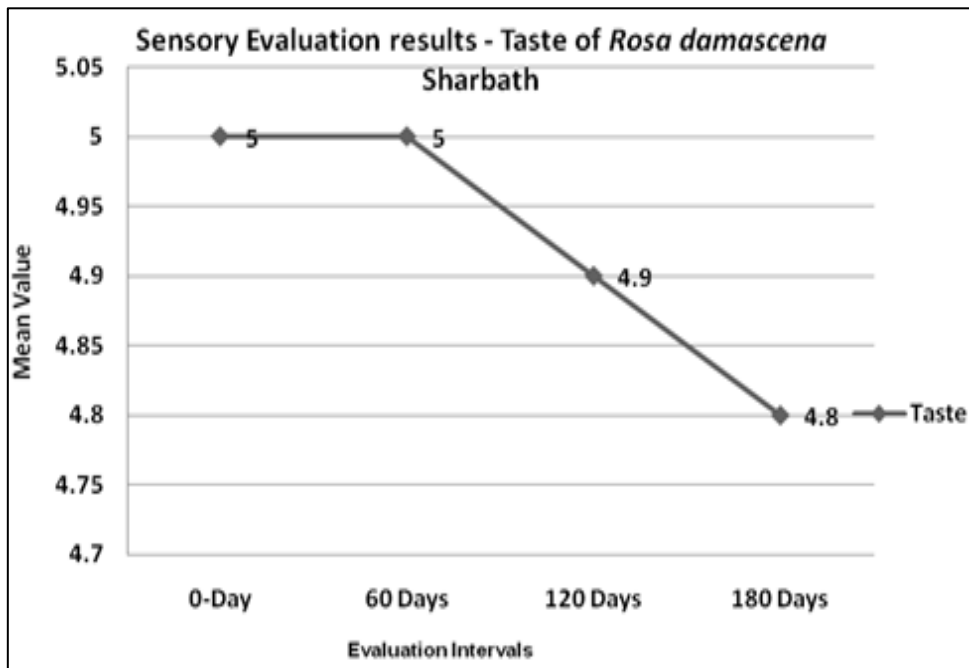


Fig 3: Mean Sensory Evaluation results - Taste of *Rosa damascena* Sharbat

In figure 3, the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 180 days with respect to the taste of *Rosa damascena* sharbat

is illustrated in a line graph. Encouraging results were observed as the product maintained its original taste even at the end of the evaluation period of 180 days.

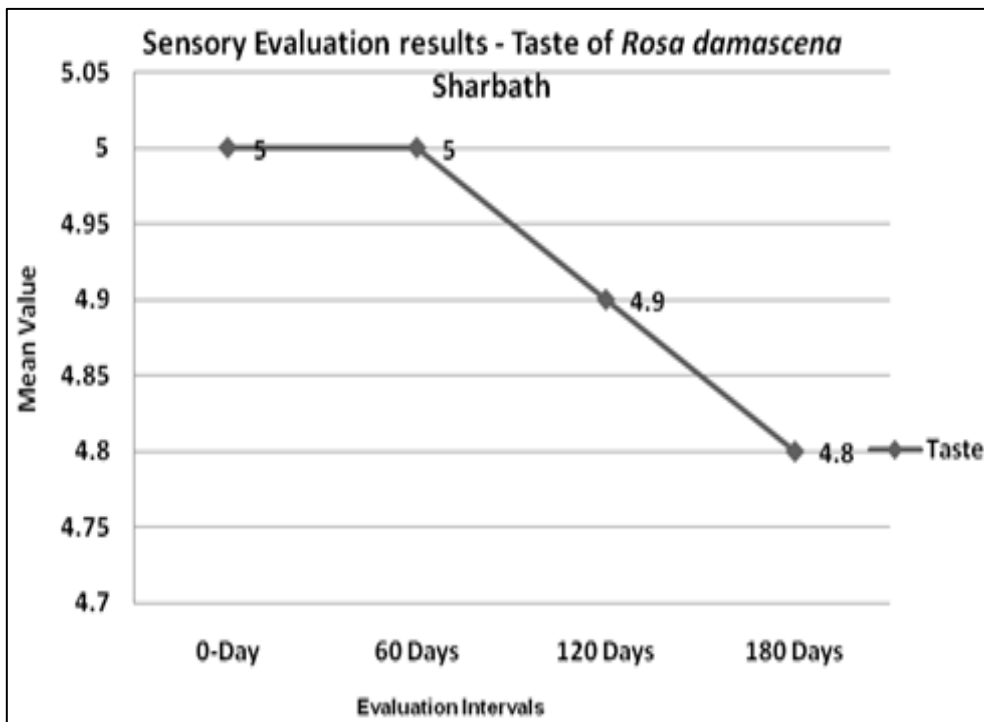


Fig 4: Mean Sensory Evaluation results - Texture of *Rosa damascena* Sharbat

In figure 4, the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 180 days with respect to the texture of *Rosa damascena*

sharbat is illustrated in a line graph. Appreciable level of change in the texture was not evident during the evaluation period of 180 days.

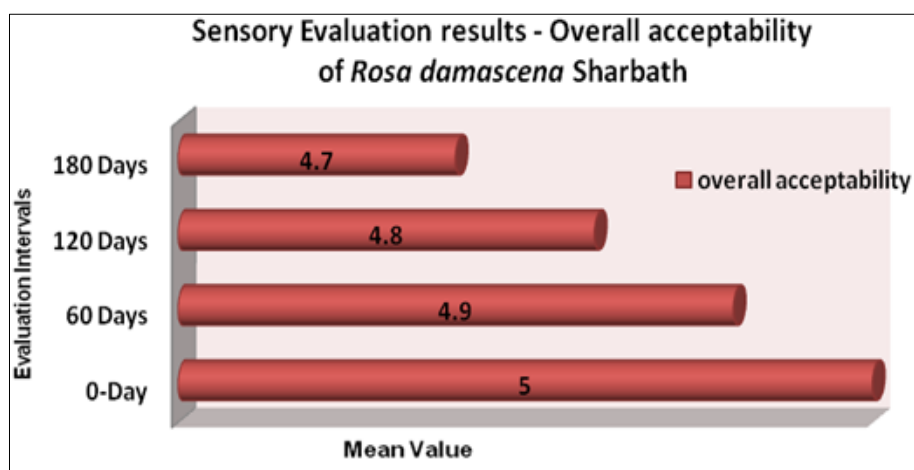


Fig 5: Mean Sensory Evaluation results - Overall acceptability of *Rosa damascena* Sharbat

In figure-5 the mean value of sensory evaluation results from the responses of the 25 semi trained panelists for a period of 180 days with respect to the overall acceptability of *Rosa damascena* sharbat is illustrated. The panelists found the product highly acceptable throughout the evaluation period of 180 days.

Findings and recommendations

The *Rosa damascena* sharbat has the functional and Nutraceutical compounds. As an amazing rejuvenating herb, it has multitude health benefits and enormous traditional uses against various diseases. Include this herb in your daily diet in the form of sharbat to revitalize the entire biological system.

Result and Conclusion

Rose preparations were found to be rich in anthocyanins which could be successfully applied in the food industry as a good source of natural pigments due to their attractive color and beneficial health effects and antioxidant activities. The value-added product, the sharbat was prepared from *Rosa damascena*. The best combination selected for rose water extract to sugar was subjected to different treatments i.e. 10, 20 and 30ml of lime juice. In those three shelf life extending treatments, 30ml of lime juice was found to be ideal. From the results of the study, it can be concluded that the *Rosa damascena* sharbat using lime juice as preservative, can be consumed safely for up to 6 months from the date of preparation. The acceptability rating of the semi trained panelists has conclusively shown that the product retains its original properties without any deterioration for a period of at least 180 days.

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