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Apeksha A Gorivale
Ph.D. Scholar, Department of
Floriculture and Landscape
Architecture, Dr. PDKV,
Akola, Maharashtra, India

Dalal SR
Head of Section, College of
Agriculture, Dr. PDKV, Akola,
Maharashtra, India

Gupta NS
Head, Department of
Floriculture and Landscape
Architecture, Dr. PDKV,
Akola, Maharashtra, India

Aishwarya R Ingole
Ph.D. Scholar, Department of
Floriculture and Landscape
Architecture, Dr. PDKV,
Akola, Maharashtra, India

Hange PR
Ph.D. Scholar, Department of
Vegetable Science, Dr. PDKV,
Akola, Maharashtra, India

Corresponding Author:
Apeksha A Gorivale
Ph.D. Scholar, Department of
Floriculture and Landscape
Architecture, Dr. PDKV,
Akola, Maharashtra, India

Sensory evaluation of mahua blended rose wine with the advancement of maturation

Apeksha A Gorivale, Dalal SR, Gupta NS, Aishwarya R Ingole and Hange PR

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Abstract

The experiment was conducted at Post-Harvest Technology Laboratory, Section of Horticulture, College of Agriculture, Akola, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the years 2021-2022 and 2022-2023 to study the changes in sensory parameters during aging of red wine prepared from blending of Rose and Mahua pulp. Wine was evaluated for sensory qualities viz., taste, aroma, colour, appearance, astringency and overall acceptability at fresh and thereafter at 2, 4, 6 and 8 months. From the investigation it was observed that the highest score secured for taste, aroma, colour, appearance, astringency and overall acceptability were recorded when mahua blended rose wine was prepared by using honey as a sugar source and blending at proportion of 80:20 (Rose pulp: Mahua pulp).

Keywords: Mahua blended rose wine, sensory evaluation, sugar sources, blending proportions, aging

Introduction

Most wines as we know it is made with grapes but it can be made from flowers too but there has been relatively little effort put into making wine from flowers. There hasn't been much research done on making wine from rose flowers and there is a strong need to emphasize the flower's health benefits. Rose petal wine captures the delicate floral aroma of fresh rose petals in a wine that's light and fresh, perfect for summertime sipping. Fresh rose petals contains 8.37° Brix TSS, 2230 mg/100g total phenols, 98.64 mg/100 mg anthocyanins, 83.90% radical scavenging activity, 293.37 mg/100g ascorbic acid and 5.47 pH. Anthocyanins and proanthocyanidins, tellimagrandin I and rugosin B, carotenoids, plant acids and essential oils are all found in rose petals. Geraniol is a primary alcohol with a rose-like odour that, when oxidized, produces the aldehyde citral, which is also found in rose petals. (Ashwani *et al.* 2017) ^[2]. It has long been regarded as a safe and healthful beverage, as well as a therapeutic agent with medicinal properties (antioxidant and antibacterial activity), and as a preventative of cardiovascular disease and type 2 diabetes.

Now a days, the researchers and food processors are getting attracted towards the underutilized crops for the development of new products. Mahua is one of them. Mahua is an important tree having vital socioeconomic value also known as Kalpavriksha and is one of the most valued trees among tribal communities whose every part is of service to the people of central India. The sundried Mahua flowers are rich in sugar (68-72%), in addition to a number of minerals and one of the most important raw material for alcohol fermentation. Due to presence of high amount of sugar, the fermentation of Mahua is faster as compared to rose petals. Looking at the properties of rose and mahua flowers the present work attempted to prepare red wine by blending of rose and mahua juice in different proportions before fermentation with addition of different sugar sources.

The goal of blending wine is to add more complexity to the flavor and texture of a wine. Blending allows to select the best characteristics of different wines and then mix them together to create a much better flavour profile. The blending proportion and sugar sources helps to improve the sensory qualities of wine.

Materials and Methods

The laboratory experiment was conducted during the year 2021-22 and 2022-23 at PHT

Laboratory, Horticulture Section, College of Agriculture, Dr. PDKV, Akola, Maharashtra. The experiment was laid out in a Factorial Completely Randomized Design (FCRD) with three replications and twelve treatment combinations. First factor comprising of three sugar sources i.e. Cane sugar, Honey and Jaggery. And second factor comprising of four blending proportions 90:10, 80:20, 70:30 and 100:00 (Rose pulp:Mahua pulp) and TSS was maintained 24°Brix. The experiment was conducted over two years and pooled data from two years were expressed in this article. Fully open *Rosa centifolia* (Cabbage rose) were procured from the local market of Nagpur and dry Mahua (*Madhuca indica*) flowers were procured from Bhandara District during October 2021-22 and 2022-23.

Sensory evaluation of wines of different treatments was conducted by a semi-trained panel of 5 judges. Each judge was given a set of wines separately and provided with a glass of fresh water to rinse their mouth before testing the next sample. Each sample was evaluated for various quality attributes viz. colour, taste, aroma, appearance, astringency and overall acceptability as per 9-point hedonic scale given by Amerine *et al.* (1986) ^[1]. Judges were asked to rate the samples on a prescribed sensory evaluation proforma with above stated attributes. The mean values of a score for sensory evaluation were calculated and reported.

Hedonic scale

Dislike extremely-1

Dislike very much-2

Dislike moderately-3

Dislike slightly-4

Neither like nor dislike-5

Like slightly-6

Like moderately-7

Like very much-8

Like extremely-9

Results and Discussion

Sensory parameters

1. Taste

The data regarding the taste score of mahua blended rose wine is presented in Table 1. The results indicated that, the maximum taste score for fresh, 2, 4, 6 and 8 months aged mahua blended rose wine was observed in treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] i.e. 6.5, 7.6, 7.8, 8.2 and 8.6, respectively. Whereas, minimum taste score was observed in treatment combination S₃B₄ [Jaggery + 100:0 (Rose pulp: Mahua pulp)] i.e. 5.3, 6.3, 6.4, 6.6 and 6.9, respectively.

From the above results it is apparent that, the maximum taste score of mahua blended rose wine observed in the interaction of effect of different sugar sources and blending proportions by treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] for fresh, 2, 4, 6 and 8 months aged mahua blended rose wine. There was a continuous increase in the taste score of mahua blended rose wine with the advancement of the maturation period of fresh to 8 months. Acidity is an important attribute as it imparts taste and flavour to the wine besides protecting the wine from spoilage (Sim and Morris, 1984) ^[12].

Similarly, it is evident that, taste scored after 8 months matured mahua blended rose wine prepared by using honey as a sugar source and blending proportion of 80:20 (Rose pulp: Mahua pulp) during maturation is adjudged as 'Like Extremely'. The result of the present investigation is supported by the findings of Belkhede (2019) ^[3], Kakade (2019) ^[9], Dakore (2021) ^[4] and Kadage (2021) ^[8].

Table 1: Effect of different sugar sources and blending proportions on taste score of mahua blended rose wine

Treatments (SxB)	Score				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
S ₁ B ₁	6.2	7.3	7.5	7.7	8.2
S ₁ B ₂	6.4	7.5	7.7	8.0	8.5
S ₁ B ₃	5.9	7.0	7.2	7.4	7.9
S ₁ B ₄	5.7	6.8	7.0	7.2	7.6
S ₂ B ₁	6.3	7.4	7.6	7.8	8.3
S ₂ B ₂	6.5	7.6	7.8	8.2	8.6
S ₂ B ₃	6.0	7.1	7.3	7.5	8.0
S ₂ B ₄	5.8	6.9	7.1	7.3	7.8
S ₃ B ₁	5.5	6.6	6.7	6.9	7.1
S ₃ B ₂	5.6	6.7	6.8	7.1	7.4
S ₃ B ₃	5.4	6.5	6.6	6.8	7.0
S ₃ B ₄	5.3	6.3	6.4	6.6	6.9

2. Aroma

The data regarding the aroma score of mahua blended rose wine is presented in Table 2. The results revealed that maximum aroma score for fresh, 2, 4, 6 and 8 months aged mahua blended rose wine was observed in treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] i.e. 6.6, 7.7, 7.9, 8.2 and 8.5, respectively. Whereas, minimum aroma score was observed in treatment combination S₃B₄ [Jaggery + 100:0 (Rose pulp: Mahua

pulp)] i.e. 5.4, 6.5, 6.6, 6.7 and 7.0, respectively.

Similarly it is evident that, aroma scored after 8 months matured mahua blended rose wine prepared by using honey as a sugar source and blending proportion of 80:20 (Rose pulp: Mahua pulp) during maturation is adjudged as 'Like Extremely'. The result of the present study are in accordance with the finding of Kakade (2019) ^[9], Dakore (2021) ^[4] and Kadage (2021) ^[8].

Table 2: Effect of different sugar sources and blending proportions on aroma score of mahua blended rose wine

Treatments (SxB)	Score				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
S ₁ B ₁	6.3	7.4	7.6	7.8	8.1
S ₁ B ₂	6.5	7.6	7.8	8.0	8.4
S ₁ B ₃	6.1	7.2	7.5	7.6	7.8
S ₁ B ₄	5.9	7.0	7.2	7.3	7.5
S ₂ B ₁	6.4	7.5	7.7	7.9	8.2
S ₂ B ₂	6.6	7.7	7.9	8.2	8.5
S ₂ B ₃	6.2	7.3	7.6	7.7	7.9
S ₂ B ₄	6.0	7.1	7.4	7.5	7.7
S ₃ B ₁	5.7	6.8	6.9	7.0	7.3
S ₃ B ₂	5.8	6.9	7.0	7.1	7.4
S ₃ B ₃	5.6	6.7	6.8	6.9	7.2
S ₃ B ₄	5.4	6.5	6.6	6.7	7.0

3. Colour

The data regarding the colour score of mahua blended rose wine are presented in Table 3. The results indicated that, in fresh, 2, 4, 6 and 8 months aged mahua blended rose wine, the maximum colour score was observed in treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] i.e. 6.6, 7.6, 7.8, 8.1 and 8.5, respectively. Whereas, minimum colour score was observed in treatment combination S₃B₄ [Jaggery + 100:0 (Rose pulp: Mahua pulp)] i.e. 5.4, 6.4, 6.5, 6.7 and 7.0, respectively.

During the course of the investigation, it was reported that, the maximum colour score of mahua blended rose wine

observed in the interaction of effect of different sugar sources and blending proportions by treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] for fresh, 2, 4, 6 and 8 months aged mahua blended rose wine. There was a continuous increase in the colour score of mahua blended rose wine with the advancement of the maturation period of fresh to 8 months. Similarly it is evident that, colour scored after 8 months matured mahua blended rose wine prepared by using honey as a sugar source and blending proportion of 80:20 (Rose pulp: Mahua pulp) during maturation is adjudged as 'Like Extremely'.

Table 3: Effect of different sugar sources and blending proportions on colour score of mahua blended rose wine

Treatments (SxB)	Score				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
S ₁ B ₁	6.3	7.3	7.5	7.8	8.2
S ₁ B ₂	6.5	7.5	7.7	8.0	8.4
S ₁ B ₃	6.1	7.1	7.3	7.6	8.0
S ₁ B ₄	5.9	6.9	7.1	7.4	7.8
S ₂ B ₁	6.4	7.4	7.6	7.9	8.3
S ₂ B ₂	6.6	7.6	7.8	8.1	8.5
S ₂ B ₃	6.2	7.2	7.4	7.7	8.1
S ₂ B ₄	6.0	7.0	7.2	7.5	7.9
S ₃ B ₁	5.6	6.6	6.7	6.9	7.2
S ₃ B ₂	5.8	6.8	6.9	7.2	7.6
S ₃ B ₃	5.5	6.5	6.6	6.8	7.1
S ₃ B ₄	5.4	6.4	6.5	6.7	7.0

The improvement in the colour might be due to the precipitation of the TSS during the maturation as discussed earlier which resulted in the clarified wine after 6 months of maturation (Kumar *et al.*, 2016) ^[10]. The result of the present investigation are supported by the findings of Dhokane (2017) ^[5], Joshi *et al.* (2012) ^[7], Dakore (2021) ^[4] and Kadage (2021) ^[8].

4. Appearance

The data regarding the appearance score of rose petal wine is presented in Table 4. The data revealed that, in fresh, 2, 4, 6 and 8 months aged rose petal wine, the maximum appearance score was observed in treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] i.e. 6.4, 7.6, 7.7, 8.1 and 8.3, respectively. Whereas, minimum appearance score was observed in treatment combination S₃B₄ [Jaggery + 100:0 (Rose pulp: Mahua pulp)] i.e. 5.3, 6.5, 6.6, 7.0 and 7.1, respectively.

During the course of the investigation, it was indicated that, the maximum appearance score of mahua blended rose wine observed in the interaction of effect of different sugar sources and blending proportions by treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] for fresh, 2, 4, 6 and 8 months aged mahua blended rose wine. There was a continuous increase in the appearance score of mahua blended rose wine with the advancement of maturation period of fresh to 12 months. Similarly it is evident that, appearance scored after 8 months matured mahua blended rose wine prepared by using honey as a sugar source and blending proportion of 80:20 (Rose pulp: Mahua pulp) during maturation is adjudged as 'Like Very Much'. The results mentioned above are in conformity with the findings of Belkhede (2019) ^[3], Dakore (2021) ^[4] and Kadage (2021) ^[8].

Table 4: Effect of different sugar sources and blending proportions on appearance score of mahua blended rose wine

Treatments (SxB)	Score				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
S ₁ B ₁	6.1	7.3	7.4	7.8	7.9
S ₁ B ₂	6.3	7.5	7.6	8.0	8.2
S ₁ B ₃	5.9	7.1	7.2	7.6	7.7
S ₁ B ₄	5.7	6.9	7.0	7.4	7.5
S ₂ B ₁	6.2	7.4	7.5	7.9	8.0
S ₂ B ₂	6.4	7.6	7.7	8.1	8.3
S ₂ B ₃	6.0	7.2	7.3	7.7	7.8
S ₂ B ₄	5.8	7.0	7.1	7.5	7.6
S ₃ B ₁	5.5	6.7	6.8	7.2	7.3
S ₃ B ₂	5.6	6.8	6.9	7.3	7.4
S ₃ B ₃	5.4	6.6	6.7	7.1	7.2
S ₃ B ₄	5.3	6.5	6.6	7.0	7.1

5. Astringency

The data regarding the astringency score of mahua blended rose wine are presented in Table 5. The data indicated that, in fresh, 2, 4, 6 and 8 months aged mahua blended rose wine, the maximum astringency score was observed in treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] i.e. 6.5, 7.7, 8.0, 8.2 and 8.4, respectively. Whereas, minimum astringency score was observed in

treatment combination S₃B₄ [Jaggery + 100:0 (Rose pulp: Mahua pulp)] i.e. 5.3, 6.4, 6.7, 6.9 and 7.2, respectively. Similarly it is evident that, astringency scored after 8 months matured mahua blended rose wine prepared by using honey as a sugar source and blending proportion of 80:20 (Rose pulp: Mahua pulp) during the maturation is adjudged as 'Like Very Much'. The result mentioned above conforms with the findings of Belkhede (2019) ^[3], Dhokane (2017) ^[5], Dakore (2021) ^[4] and Kadage (2021) ^[8].

Table 5: Effect of different sugar sources and blending proportions on astringency score of mahua blended rose wine

Treatments (SxB)	Score				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
S ₁ B ₁	6.1	7.3	7.6	7.8	8.0
S ₁ B ₂	6.4	7.6	7.9	8.1	8.3
S ₁ B ₃	5.9	7.1	7.4	7.6	7.8
S ₁ B ₄	5.7	6.9	7.2	7.4	7.6
S ₂ B ₁	6.2	7.4	7.7	7.9	8.1
S ₂ B ₂	6.5	7.7	8.0	8.2	8.4
S ₂ B ₃	6.0	7.2	7.5	7.7	7.9
S ₂ B ₄	5.8	7.0	7.3	7.5	7.7
S ₃ B ₁	5.5	6.7	7.0	7.2	7.4
S ₃ B ₂	5.6	6.8	7.1	7.3	7.5
S ₃ B ₃	5.4	6.6	6.9	7.1	7.3
S ₃ B ₄	5.3	6.4	6.7	6.9	7.2

6. Overall acceptability

The data regarding the overall acceptability score of mahua blended rose wine are presented in Table 6. From the data it is exhibited that, for fresh, 2, 4, 6 and 8 months aged mahua blended rose wine, the maximum overall acceptability score was observed in treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] i.e. 6.7, 7.7, 8.0, 8.2 and 8.4, respectively. Whereas the minimum overall acceptability score was observed in treatment combination S₃B₄ [Jaggery + 100:0 (Rose pulp: Mahua pulp)] i.e. 5.3, 6.4, 6.6, 6.7 and 7.0, respectively.

From the result it is revealed that, the maximum overall acceptability score of mahua blended rose wine observed in the interaction of effect of different sugar sources and

blending proportions by treatment combination S₂B₂ [Honey + 80:20 (Rose pulp: Mahua pulp)] for fresh, 2, 4, 6 and 8 months aged mahua blended rose wine. There was a continuous increase in the overall acceptability score of mahua blended rose wine with the advancement of the maturation period of fresh to 8 months. Similarly it is evident that, overall acceptability scored after 8 months matured mahua blended rose wine prepared by using honey as a sugar source and blending proportion of 80:20 (Rose pulp: Mahua pulp) during the maturation is adjudged as 'Like Very Much'.

The result of the present study is supported by the findings of Govinda (2016) ^[6], Kakade (2019) ^[9], Dakore (2021) ^[4] and Kadage (2021) ^[8].

Table 6: Effect of different sugar sources and blending proportions on overall acceptability score of mahua blended rose wine

Treatments (SxB)	Score				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
S ₁ B ₁	6.3	7.3	7.6	7.8	8.0
S ₁ B ₂	6.6	7.6	7.9	8.1	8.3
S ₁ B ₃	6.0	7.0	7.3	7.5	7.7
S ₁ B ₄	5.8	6.8	7.1	7.2	7.5
S ₂ B ₁	6.4	7.4	7.7	7.9	8.1
S ₂ B ₂	6.7	7.7	8.0	8.2	8.4
S ₂ B ₃	6.1	7.1	7.4	7.6	7.8
S ₂ B ₄	5.9	6.9	7.2	7.4	7.6
S ₃ B ₁	5.5	6.6	6.8	6.9	7.2
S ₃ B ₂	5.7	6.7	7.0	7.1	7.4
S ₃ B ₃	5.4	6.5	6.7	6.8	7.1
S ₃ B ₄	5.3	6.4	6.6	6.7	7.0

7. Conclusion

The taste, aroma, colour, appearance, astringency and overall acceptability scores of mahua blended rose wine prepared with different sugar sources and blending proportions were increased continuously during the advancement of the maturation period of 8 months. The highest score secured for taste, aroma, colour, appearance, astringency and overall acceptability were recorded when wine was prepared by using honey as a sugar source and selecting a blending proportion of 80:20 (Rose pulp: Mahua pulp) while making mahua blended rose wine and adjudged as 'Like Very Much'.

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