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Sensory evaluation of rose petal wine with the advancement of maturation

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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 2020-2021 and 2021-2022 to study the changes in sensory parameters during aging of red wine prepared from Rose petals. 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 wine was prepared by *Saccharomyces cerevisiae* inoculum of 15 ml/l and TSS 24 °Brix.

Keywords: Rose petal wine, sensory evaluation, saccharomyces levels, TSS levels, aging

Introduction

Rose is one of the most popular flowers in the world, ranking first among commercial cut flowers. Roses are so popular that they are cultivated professionally to suit the demand for cut blooms because of their wide variation in plant development, flower colour, flower shape, scent, the gradual opening of petals and good keeping quality. In both, domestic and foreign markets, rose is in high demand in the form of a loose flower, dry petals, long-stemmed flower and by-products such as rose water, rose syrup, gulkand, perfume, and so on. 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.

Fresh rose petals contain 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. L-citronellol, which makes up around 20% of rose oil, is also present. (Zhang *et al.*, 2011) [14].

It has long been regarded as a safe and healthful beverage, as well as a therapeutic agent with medicinal properties (antioxidant and antibacterial activity), as a prolonging of life, and as a preventative of cardiovascular disease and type 2 diabetes. The production of rose petal wine with appealing colour, aroma, medicinal, and nutraceutical compounds would appeal to consumers in terms of health advantages. The extraction of rose petal ingredients into wine results in a highly valued health drink. As a result, attempts have been made for yeast-assisted alcoholic fermentation and the extraction of rose components into wine utilizing different levels of TSS on the digestibility of rose compounds.

Material and Methods

The laboratory experiment was conducted during the year 2020-21 and 2021-22 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 levels of *Saccharomyces cerevisiae* var. *ellipsoideus* inoculum of 15, 20 and 25 ml/l.

And second factor comprising of four levels of total soluble solids (TSS) 24, 26, 28 and 30°Brix. The experiment was conducted over two years and pooled data from two years were expressed in this article. Fully open *Rosa centifolia* (Desi roses) was procured during November 2020-21 and 2021-22 from the local market of Nagpur.

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 aroma score of rose petal wine is presented in Table 1. The results indicated that, the maximum taste score for fresh, 2, 4, 6 and 8 months aged rose petal wine was observed in treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) i.e. 6.4, 7.4, 7.8, 8.2 and 8.6, respectively. Whereas, minimum taste score was observed in treatment combination Y₃T₄ (*Saccharomyces cerevisiae* inoculum of 25 ml/l + TSS 30°Brix) i.e. 5.1, 6.2, 6.3, 6.4 and 6.7, respectively.

From the above results it is apparent that, the maximum taste score of rose petal wine observed in the interaction of effect of yeast levels and TSS levels by treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) for fresh, 2, 4, 6 and 8 months aged rose petal wine. There was a continuous increase in the taste score of rose petal 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.

Similarly, it is evident that, taste scored after 8 months matured rose petal wine prepared by using *Saccharomyces cerevisiae* inoculum of 15 ml/l and maintaining TSS 24°Brix during maturation is adjudged as 'Like Extremely'. The result of the present investigation is supported by the findings of Belkhede (2019) [2], Kakade (2019) [8], Pali (2019) [10], Dakore (2021) [3] and Kadage (2021) [7].

Table 1: Effect of different levels of yeast and TSS on taste score of rose petal wine

Treatments (YxT)	Taste				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
Y ₁ T ₁	6.4	7.4	7.8	8.2	8.6
Y ₁ T ₂	6.1	7.2	7.3	7.5	7.9
Y ₁ T ₃	6.0	7.0	7.1	7.2	7.6
Y ₁ T ₄	5.3	6.3	6.4	6.5	6.9
Y ₂ T ₁	6.2	7.3	7.5	8.0	8.4
Y ₂ T ₂	6.1	7.1	7.3	7.4	7.8
Y ₂ T ₃	5.7	6.7	6.9	7.0	7.3
Y ₂ T ₄	5.3	6.3	6.4	6.6	6.9
Y ₃ T ₁	6.1	7.2	7.4	7.6	8.0
Y ₃ T ₂	6.0	7.1	7.2	7.3	7.7
Y ₃ T ₃	5.5	6.6	6.7	6.8	7.2
Y ₃ T ₄	5.1	6.2	6.3	6.4	6.7

2. Aroma

The data regarding the aroma score of rose petal wine is presented in Table 2. The results revealed that maximum aroma score for fresh, 2, 4, 6 and 8 months aged rose petal wine was observed in treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) i.e. 6.5, 7.6, 7.8, 8.2 and 8.5, respectively. Whereas, minimum aroma score was observed in treatment combination Y₃T₄ (*Saccharomyces cerevisiae* inoculum of

25 ml/l + TSS 30 °Brix) i.e. 5.2, 6.3, 6.4, 6.5 and 6.8, respectively.

Similarly, it is evident that, aroma scored after 8 months matured rose petal wine prepared by using *Saccharomyces cerevisiae* inoculum of 15 ml/l and maintaining TSS 24°Brix during maturation is adjudged as 'Like Extremely'. The result of the present study are in accordance with the finding of Veena (2011, Kakade (2019) [8], Dakore (2021) [3] and Kadage (2021) [7].

Table 2: Effect of different levels of yeast and TSS on aroma score of rose petal wine

Treatments (YxT)	Aroma				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
Y ₁ T ₁	6.5	7.6	7.8	8.2	8.5
Y ₁ T ₂	6.2	7.3	7.5	7.6	7.9
Y ₁ T ₃	6.0	7.1	7.2	7.4	7.6
Y ₁ T ₄	5.6	6.7	6.8	6.9	7.2
Y ₂ T ₁	6.4	7.5	7.6	8.1	8.3
Y ₂ T ₂	6.2	7.2	7.4	7.5	7.8
Y ₂ T ₃	6.0	7.1	7.2	7.4	7.6
Y ₂ T ₄	5.4	6.4	6.7	6.8	7.0
Y ₃ T ₁	6.3	7.4	7.5	7.7	8.0
Y ₃ T ₂	6.1	7.2	7.3	7.5	7.7
Y ₃ T ₃	5.8	6.9	7.0	7.1	7.4
Y ₃ T ₄	5.2	6.3	6.4	6.5	6.8

3. Colour

The data regarding the colour score of rose petal wine are presented in Table 3. The results indicated that, in fresh, 2, 4, 6 and 8 months aged rose petal wine, the maximum colour score was observed in treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) i.e. 6.5, 7.5, 7.7, 8.2 and 8.5, respectively. Whereas, minimum colour score was observed in treatment combination Y₃T₄ (*Saccharomyces cerevisiae* inoculum of 25 ml/l + TSS 30 °Brix) i.e. 5.5, 6.5, 6.6, 6.7 and 6.9, respectively. During the course of the investigation, it was reported that, the maximum colour score of rose petal wine

observed in the interaction of effect of yeast levels and TSS levels by treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) for fresh, 2, 4, 6 and 8 months aged rose petal wine. There was a continuous increase in the colour score of rose petal wine with the advancement of the maturation period of fresh to 8 months. Similarly, it is evident that, colour scored after 8 months matured rose petal wine prepared by using *Saccharomyces cerevisiae* inoculum of 15 ml/l and maintaining TSS 24°Brix during the maturation is adjudged as 'Like Extremely'.

Table 3: Effect of different levels of yeast and TSS on colour score of rose petal wine

Interaction (YxT)	Colour				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
Y ₁ T ₁	6.5	7.5	7.7	8.2	8.5
Y ₁ T ₂	6.3	7.4	7.5	7.6	8.0
Y ₁ T ₃	6.2	7.2	7.3	7.3	7.7
Y ₁ T ₄	5.9	6.9	7.0	6.9	7.3
Y ₂ T ₁	6.4	7.4	7.6	8.0	8.4
Y ₂ T ₂	6.3	7.4	7.5	7.5	7.9
Y ₂ T ₃	6.1	7.2	7.3	7.4	7.7
Y ₂ T ₄	5.7	6.7	6.8	6.8	7.2
Y ₃ T ₁	6.3	7.3	7.5	7.8	8.1
Y ₃ T ₂	6.3	7.3	7.4	7.5	7.9
Y ₃ T ₃	6.1	7.1	7.2	7.2	7.5
Y ₃ T ₄	5.5	6.5	6.6	6.7	6.9

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). The result of the present investigation are supported by the findings of Pratima *et al.* (2006), Rajvaidya (2017), Dhokane (2017), Joshi *et al.* (2012b), Dakore (2021)^[3] and Kadage (2021)^[7].

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 Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) i.e. 6.6, 7.7, 7.8, 8.1 and 8.2, respectively. Whereas, minimum appearance score was observed in treatment combination Y₃T₄ (*Saccharomyces cerevisiae*

inoculum of 25 ml/l + TSS 30 °Brix) i.e. 5.5, 6.5, 6.6, 6.8 and 6.9, respectively.

During the course of the investigation, it was indicated that, the maximum appearance score of rose petal wine observed in the interaction of effect of yeast levels and TSS levels by treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) for fresh, 2, 4, 6 and 8 months aged rose petal wine. There was a continuous increase in the appearance score of rose petal wine with the advancement of maturation period of fresh to 12 months. Similarly, it is evident that, appearance scored after 8 months matured rose petal wine prepared by using *Saccharomyces cerevisiae* inoculum of 15 ml/l and maintaining TSS 24°Brix during maturation is adjudged as 'Like Extremely'. The results mentioned above are in conformity with the findings of various research workers. Belkhele (2019)^[2], Pali (2019)^[10], Veena (2011), Dakore (2021)^[3] and Kadage (2021)^[7].

Table 4: Effect of different levels of yeast and TSS on appearance score of rose petal wine

Interaction (YxT)	Appearance				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
Y ₁ T ₁	6.6	7.7	7.8	8.1	8.2
Y ₁ T ₂	6.4	7.4	7.6	7.7	7.8
Y ₁ T ₃	6.2	7.2	7.3	7.4	7.6
Y ₁ T ₄	5.6	6.6	6.7	7.1	7.2
Y ₂ T ₁	6.5	7.5	7.7	7.9	8.0
Y ₂ T ₂	6.4	7.4	7.6	7.6	7.8
Y ₂ T ₃	6.3	7.4	7.6	7.4	7.5
Y ₂ T ₄	5.9	6.9	7.0	7.0	7.1
Y ₃ T ₁	6.1	7.2	7.4	7.7	7.9
Y ₃ T ₂	6.3	7.3	7.5	7.5	7.7
Y ₃ T ₃	6.1	7.1	7.2	7.3	7.5
Y ₃ T ₄	5.5	6.5	6.6	6.8	6.9

5. Astringency

The data regarding the astringency score of rose petal wine are presented in Table 5.

Table 5: Effect of different levels of yeast and TSS on astringency score of rose petal wine

Interaction (YxT)	Astringency				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
Y ₁ T ₁	6.7	7.8	8.0	8.2	8.4
Y ₁ T ₂	6.5	7.5	7.7	7.9	8.0
Y ₁ T ₃	6.3	7.4	7.5	7.6	7.7
Y ₁ T ₄	6.0	7.1	7.2	7.3	7.4
Y ₂ T ₁	6.6	7.7	7.9	8.1	8.2
Y ₂ T ₂	6.5	7.5	7.7	7.7	7.8
Y ₂ T ₃	6.3	7.3	7.4	7.6	7.7
Y ₂ T ₄	5.7	6.7	6.8	6.9	7.1
Y ₃ T ₁	6.5	7.6	7.8	7.9	8.1
Y ₃ T ₂	6.5	7.5	7.6	7.7	7.9
Y ₃ T ₃	6.2	7.2	7.3	7.5	7.6
Y ₃ T ₄	5.8	6.8	6.9	7.1	7.2

The data indicated that, in fresh, 2, 4, 6 and 8 months aged rose petal wine, the maximum astringency score was observed in treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) i.e. 6.7, 7.8, 8.0, 8.2 and 8.4, respectively. Whereas, minimum astringency score was observed in treatment combination Y₂T₄ (*Saccharomyces cerevisiae* inoculum of 25 ml/l + TSS 24 °Brix) i.e. 5.7, 6.7, 6.8, 6.9 and 7.1, respectively.

Similarly, it is evident that, astringency scored after 8 months matured rose petal wine prepared by using *Saccharomyces cerevisiae* inoculum of 15 ml/l and maintaining TSS 24°Brix during the maturation is adjudged as 'Like Extremely'. The result mentioned above conforms with the findings of Belkhede (2019) [2], Pali (2019) [10],

Dhomane (2017), Dakore (2021) [3] and Kadage (2021) [7].

6. Overall acceptability

The data regarding the overall acceptability score of rose petal wine are presented in Table 6. From the data it is exhibited that, for fresh, 2, 4, 6 and 8 months aged rose petal wine, the maximum overall acceptability score was observed in treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) i.e. 6.7, 7.7, 7.9, 8.1 and 8.3, respectively. Whereas the minimum overall acceptability score was observed in treatment combination Y₃T₄ (*Saccharomyces cerevisiae* inoculum of 25 ml/l + TSS 30 °Brix) i.e. 5.1, 6.3, 6.4, 6.5 and 6.8, respectively.

Table 6: Effect of different levels of yeast and TSS on overall acceptability score of rose petal wine.

Interaction (YxT)	Overall Acceptability				
	Fresh Wine	At 2 Months of Maturation	At 4 Months of Maturation	At 6 Months of Maturation	At 8 Months of Maturation
Y ₁ T ₁	6.7	7.7	7.9	8.1	8.3
Y ₁ T ₂	6.3	7.4	7.6	7.7	7.9
Y ₁ T ₃	6.1	7.2	7.3	7.4	7.7
Y ₁ T ₄	5.5	6.8	6.7	6.8	7.1
Y ₂ T ₁	6.4	7.6	7.8	7.8	8.1
Y ₂ T ₂	6.3	7.4	7.6	7.7	7.8
Y ₂ T ₃	6.0	7.0	7.2	7.3	7.6
Y ₂ T ₄	5.3	6.5	6.5	6.6	6.9
Y ₃ T ₁	6.3	7.5	7.7	7.7	8.0
Y ₃ T ₂	6.2	7.3	7.5	7.6	7.9
Y ₃ T ₃	6.0	7.0	7.1	7.3	7.5
Y ₃ T ₄	5.1	6.3	6.4	6.5	6.8

From the result it is revealed that, the maximum overall acceptability score of rose petal wine observed in the interaction of effect of yeast levels and TSS levels by treatment combination Y₁T₁ (*Saccharomyces cerevisiae* inoculum of 15 ml/l + TSS 24 °Brix) for fresh, 2, 4, 6 and 8 months aged rose petal wine. There was a continuous increase in the overall acceptability score of rose petal 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 rose petal wine prepared by using *Saccharomyces cerevisiae* inoculum of 15 ml/l and maintaining TSS 24°Brix during the maturation is adjudged as 'Like Extremely'. The result of the present study is supported by the findings of Govinda (2016), Pali (2019)^[10], Kakade (2019)^[8], Dakore (2021)^[3] and Kadage (2021)^[7].

Conclusion

The taste, aroma, colour, appearance, astringency and overall acceptability scores of rose petal wine prepared with different levels of yeast and TSS 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 *Saccharomyces cerevisiae* inoculum of 15 ml/l and TSS 24 °Brix.

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