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# PERPARARTION OF WINE FROM DRIED SHOE FLOWER (Hibiscus) AND DAMASK ROSE (Rosa damascene) PETALS

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## Abstract

Wine was made from dried Hibiscus and Damask rose petals extracts using Saccharomyces cerevisiae strains and then subjected to physicochemical assessments using basic analytical procedures. The reference for sensory evaluation was imported commercial red wine. The dried Hibiscus and Damask rose petals wine had a pH of 3.15, a titratable acidity of 0.35%, and an alcohol level of 8.16% (w/v), all of which were within herbal wine standards. The sensory qualities of the dried Hibiscus and Damask rose petals wine did not differ significantly from those of the imported red wine, indicating that dried Hibiscus and Damask rose petals might be used to generate acceptable coloured wine.

Keywords: Wine, Hibiscus petal, Damask rose petals, Fermentation,

## Introduction

Wine is one of the world's oldest and most widely consumed alcoholic beverages (Gutierrez-Escobar et al., 2021). Consuming alcoholic beverages since the Neolithic era, (Tiwari et al 2017). There are popularly found and known in the United States, France, Italy, Germany, and China, with an annual consumption of 120 million hectoliters (Gutierrez-Escobar et al., 2021). Wine is a naturally fermented beverage prepared from the juice of various fruits, vegetables, and flowers (Suresh et al.,2019). Wine is made up of alcohol, sugars, acids, tannins, minerals, proteins, and other chemicals such organic acids, volatile compounds, and phenolic compounds (Gutierrez-Escobar et al., 2021). Fermentation of alcohol, acetic acid, and lactic acid is critical for product quality. Among these, alcoholic fermentation is commonly used in the production of beverages containing a significant amount of alcohol. An alcoholic beverage is a beverage which also containing ethanol (Saranraj et al.,2017).

Fermentation is a practical strategy for developing new products with altered physicochemical and sensory properties, including flavor, tastes, and nutritional components. Where the release of amino acids and other nutrients from yeast during

fermentation increases the nutritional value of wine (Swami et al.,2014). Fermentation is the process by which the glucose in the juice are converted into alcohol and carbon dioxide. During the fermentation process the yeast consumes the sugar (Suresh et al.,2019). Yeast species such as Saccharomyces and non-Saccharomyces budding yeasts yield fermented drinks in Fermented foods the aroma, flavor, and taste are frequently related to the yeasts utilized in the fermentation process and the beginning components. Thus, the yeasts utilized in fermentation procedures are critical in imparting distinct qualities to fermented foods (Onyeka et al.,2017).

Although Indian wine production is increasing, it accounts for less than 1% of global wine production. In this era, both urban and rural people are showing an increasing trend toward wine consumption, necessitating the production of larger quantities and diverse types of wine. Fruits wine like Grape wine, apple cider wine, rice wine, apple wine, peach wine, and other fruit wines are produced in India. Aside from fruit-based wine, there are flowers which have medicinal properties can be used for wine making (Yadav et al.,2021). Flowers having traditional medicinal uses are being studied more thoroughly in order to be considered as a substitute or better alternative for chemical-based food preservatives. Flowers can also be a great source of natural antioxidants and can be used efficiently in the food business as a source of dietary supplements or as natural antioxidants to protect the quality and improve the shelf-life of food goods (Mak et al.,2013). Shoe flower (*Hibiscus)* and Damask rose *(Rosa damascene)* flowers have been called the *"King of Flowers."* It is well-known for its beautiful hue and delicate aroma. This flower's petals are a mild to moderate pink to light crimson colour (Liamkaew et al.,2022). Which were used to produce as herbal wine with excellent sensory and physicochemical features (Gutierrez-Salomon et al.,2021).

Shoe flower *(Hibiscus)* a member of the Malvaceae family, is a significant annual crop grown effectively in tropical and subtropical environments. Hibiscus is a widely grown plant in Nigeria, especially in the country's north-eastern and central belt regions (Omole et al.,2019). Hibiscus has roughly 200 species that are found all over the world. Tropical and subtropical climates Hibiscus is a popular garden plant (Khristi et al.,2017). This flower are high in anthocyanins and contains organic acids such as citric, malic, and tartaric acids (Alobo et al 2009). It has been discovered that its constituents, including vitamins (C and E), polyphenols, acids, and flavonoids, primarily anthocyanins, have useful qualities. They are beneficial to health as a good source of antioxidants and a natural food colorant. Hibiscus juice combined with tropical fruit juices is expected to yield products with excellent nutritional content and functional activity. Hibiscus sabdariffa calyx is widely utilized by humans as food, jams, jellies, juice beverages, wine, and medicinal syrups (Shruthi et al.,2019).

The Damask rose (Rosa damascena) is the most significant aromatic shrub in the Rosaceae family. This family consists over 200 species of the Rosa genus are widely spread in Europe, Asia, North America, and the Middle East (Ali et al., 2022). Normally, rose petals are colourant and fragrance-rich (Drozdz et al.,2019). Many essential components are present, including terpenes, glycosides, flavonoids, and anthocyanins. Rose also contains carboxylic acid, myrcene, vitamin C, and other nutrients (Labban et al.,2020). Damask rose has been shown to have anticancer, anticarcinogenic, and cytotoxic properties against cancer cells. Damask gained to prominence in the treatment of cardiovascular diseases. Damask rose may be useful in improving cardiovascular function because ACE is a critical enzyme in the generation of angiotensin II. Damask rose antioxidant activity is not related to anthocyanin levels, but it is related to total phenolic and flavanol contents (Hanif et al.,2019).

Fermentation is a natural process that takes place when yeast is added to a fermented mixture containing beverage. The starches in the liquid are converted to sugars by complex chemical reactions. After that, the sugars are converted into carbon dioxide and alcohol (Dittmer et al.,2014). S. cerevisiae var. ellipsoideus, and Saccharomyces uvarum are prevalent in the brewing and winemaking industries (Kumsa et al.,2020). Using S. cerevisiae species that convert the sugar in flower juices

into alcohol and organic acids, which further react to generate aldehydes, esters, and other chemical compounds that help preserve the wine. Other yeasts, have also been utilised in the creation of wine (Dittmer et al.,2014& Saranraj et al.,2017).

To the best of our knowledge, there are no publications that compare the sensory and physicochemical characteristics of dried hibiscus and damask rose petals wine obtained from fermentation. Therefore, aimed at evaluating the effects of fermentation on the sensory and physicochemical characteristics described by consumers.

## Materials and Methods

The present study entitled "Preparation of Wine from Dried Hibiscus and Damask Rose Petals" was carried out in the Department of Food Technology, Parul University, Vadodara. The materials used in preparation of dried hibiscus and damask rose petals wine were dried hibiscus petal, damask rose petals, yeast *(Saccharomyces cerevisiae)* are from online market and sugar from local market of Vadodara. Equipment used for the preparation of flower wine are: Weighing balance, heating medium, other utensils, hand refractometer, pH paper, and hydrometer

1. Extraction

   Dried hibiscus and damask rose petals were weighed (25g each) and decocted by adding into 1L of boiling water and kept for 10 min. They were strained using sterile muslin cloth and the residual were separated which can be further re-extracted.

2. Preparation

   Five grams of dry yeast was mixed in 100 ml warm water, which were preheated to 35°C to 37°C. The water was sweetened to 15°Brix with sugar to active the yeast. Mixing the water and yeast before adding in the extraction.

3. Addition

   Addition of table sugar in the extraction at 25° to 26°Brix. Mixing the sugar till it dissolved well in extraction and cooling it at room temperature. After cooling the addition of active yeast is add to the extraction.

4. Fermentation

   The standard extraction was poured into a 1 ½ L sterile glass bottle for the fermentation. The bottle was fitted with balloons which was use as air lock and kept for 7 days for fermentation at room temperature. After 7 days the bottle was filtered with sterile muslin cloth at room temperature. Same method was followed after 21 days. The racked wine was aged at room temperature in pasteurized bottle for 30 days.

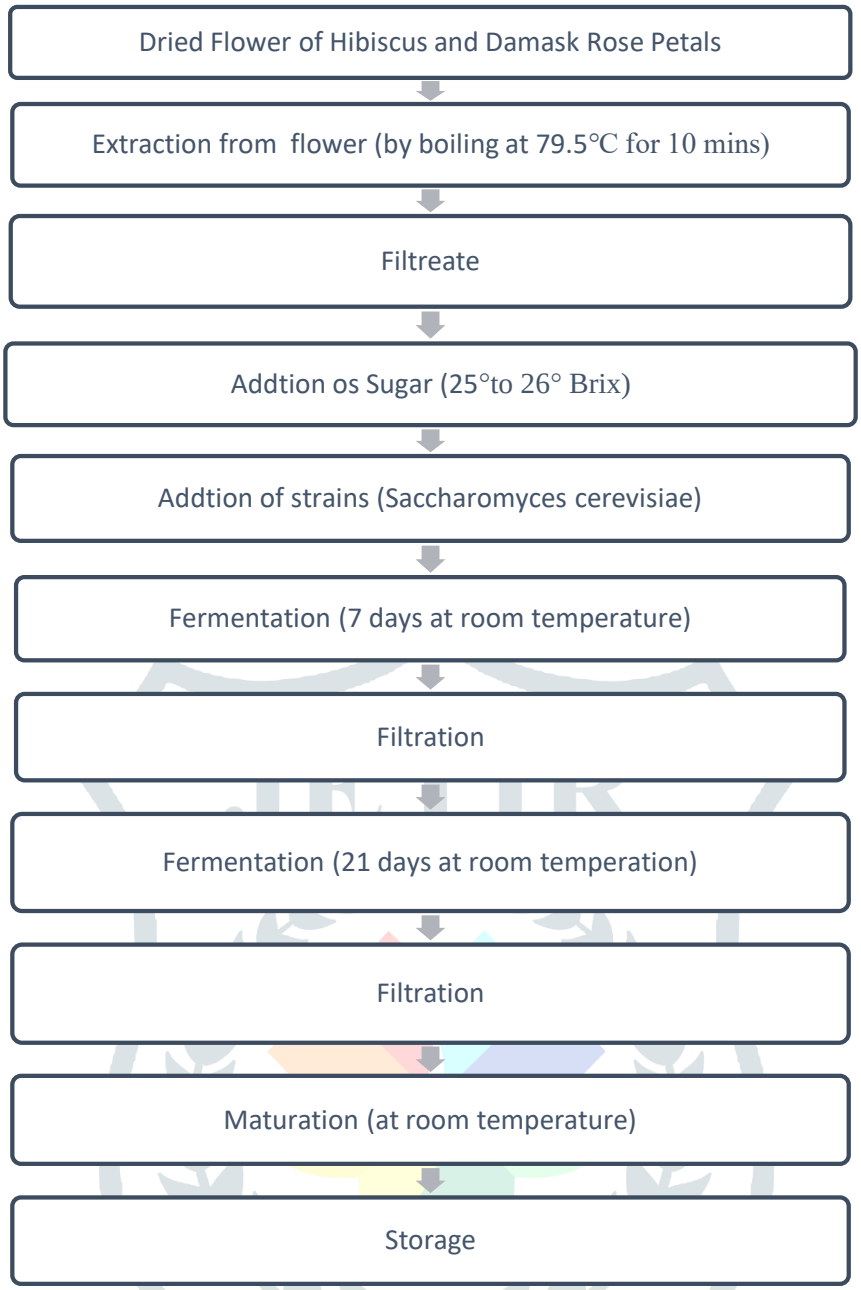


Fig 1: Flow chart for making herbal wine using dried hibiscus and damask rose petals

## Physicochemical analysis

1. Total Soluble Solids (TSS)

   TSS content was measured using a hand refractometer calibrated with distilled water. TSS values were reported as Brix degrees (°Bx).

2. Alcohol content

   Alcohol content was determined with a 100 ml sample from each product using the specific gravity method.

   **Alcohol content by volume (%) = (Original Gravity-Final Gravity) ×131.25**

3. pH

   The pH was measured using a pH metre. The pH electrode was calibrated with a standard buffer solution before being dipped in the wine samples to obtain a consistent reading. The metre reading was taken three times and the average was computed.

4. Colour

   The lightness, chroma, and hue (L, C, h) values of wine were measured using a Minolta chroma metre CR-410. 15 mL samples were placed in a glass Petri dish (7.4 cm diameter). The colour was then measured by immersing the chroma meter's measuring port in the liquid at 1 cm and pushing the measurement trigger.

5. Total Titratable Acidity (TTA)

   The wine sample was measured at 15 mL, and 75 mL of distilled water was added, followed by 3 drops of phenolphthalein indicator, and titrated against 0.1M NaOH solution until the colour changed to pink. The result was recorded and used to calculate total titratable acidity. Total Titratable Acidity was calculated by:

$$\mathbf{TTA} = \frac{\textbf{Volume of NaOH}}{\textbf{Volume of wine}} \times \mathbf{75}$$

6. Total Viable Plate Count (TPC)

   At the end of 21 days fermentation, microbiological culture was done on Potato Dextrose Agar to check for viable cells.

## Sensory evaluation

The bottled wine samples were evaluated for colour, taste and overall acceptability rating by a panel of 20 randomly selected men and women of between 18-40 years of age, who are familiar with testing wines. Each assessor was presented with chilled (15±2°C) coded samples of wine in a clear glass tumbler and asked to taste the samples and rate their impression on a 9-point hedonic scale from excellent to extremely bad. Two fully fermented imported red wines and one red wine made were used as comparative references samples. The coded developed wine samples were also separately presented to the respective assessors to indicate if they would buy the wine if it were presented for sale.

## Results and Discussion

The use of dried hibiscus and damask rose petals wine production sounds typical, however the novelty of this work is the use of dried hibiscus and damask rose petals in the wine production, which is fermented using a locally created yeast *(Saccharomyces cerevisiae)* and sugar which was unitized by yeast from production of alcohol. Table 1 showing the changes in the physicochemical properties during the 21 days of fermentation of wine.

Table 1: Changes in some physico-chemical properties during fermentation of dried hibiscus and damask rose petals wine

| Days | TSS (°Bx) | pH | TTA (%) | Alcohol [% (w/v)] |
|---|---|---|---|---|
| 0 | 40 | 4.12 | 0.6 | 0 |
| 1 | 37 | 4.01 | 0.7 | 0.87 |
| 5 | 32 | 3.90 | 0.15 | 2.61 |
| 9 | 28 | 3.68 | 0.22 | 4.35 |
| 13 | 25 | 3.46 | 0.27 | 6.09 |
| 17 | 23 | 3.35 | 0.31 | 7.83 |
| 21 | 21 | 3.15 | 0.35 | 9.57 |

The physicochemical characteristics (table 2) of the dried hibiscus and damask rose petals wine prepared with yeast strains which clearly show that the combination of dried petals are suitable for wine production and have fermentability, colour, pH, and no effect on titratale acidity. Colour of the dried hibiscus and damask rose petals wine was red. TSS of the wine Brix ranged from 40°Bx. during fermentation the concentration of sugar of wine was decrease to 21°Bx. The TSS was quite high were the residual sugar content was low and the resultant formation of 8.16% alcohol by the 21th day of fermentation suggest the efficiency and suitability of the yeast for use in the fermentation of the dried hibiscus and damask rose petals wine which is great interest to produce quality wine. The high yield of alcohol is attributed to the breakdown of soluble solids in the wine. This is also responsible for gradual decrease in pH and increase in TTA of the wine during fermentation. TTA of the wine increased from 0.6 to 0.35 %. Thus, yeasts did not influence the acid production in the wine and is desirable. The pH value ranged from 4.12 to 3.15 in wine. The total plate count was done to check the microbiological culture in the wine which was under the FSSAI limits.

Table 1: Physicochemical composition of the dried hibiscus and damask rose petals wine

| Sr no | Analysis | Results |
|---|---|---|
| 1 | TSS | 21°Bx |
| 2 | Alcohol (% v/v) | 8.16 % |
| 3 | pH | 3.15 |
| 4 | Total titratable acidity (g/L) | 0.35 % |

## Sensory Analysis

The results of the sensory evaluation of the dried hibiscus and damask rose petals wine (Table 2). There were no significant differences in colour, flavour, aroma, taste and over all acceptability between the wine and a reference imported red wine. However, the taste of the dried hibiscus and damask rose petals wine was significantly different from that of reference wine sample. The dried hibiscus and damask rose petals wine is rated higher than reference wine sample in all attributes except in aroma.

Table 2: Organoleptic evaluation of the dried hibiscus and damask rose petals wine

| Sr no | Attributes | Sample 1 | Sample 2 |
|---|---|---|---|
| 1 | Colour | 7 | 7.5 |
| 2 | Clarity | 8 | 7.5 |
| 3 | Taste and aroma | 6 | 7 |
| 4 | Flavour | 8 | 8 |
| 5 | Overall acceptability | 7 | 8 |

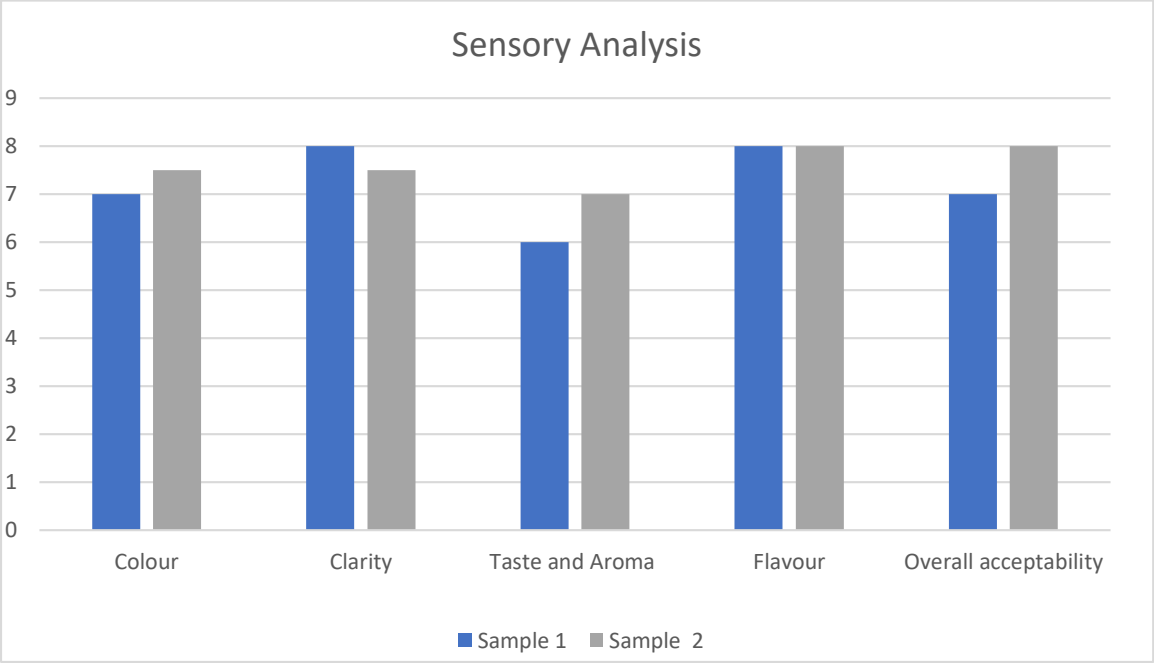


Fig 2: Sensory analysis of o the dried hibiscus and damask rose petals wine

## Conclusion

The wine made from dried hibiscus and damask rose petals was determined to be acceptable, meeting all of the criteria for a decent wine in terms of colour, flavour, taste, aroma, and general acceptability. The dried hibiscus and damask rose petals wine is widely available and inexpensive, making it a viable substrate for the wine business. The use of dried hibiscus and damask rose petals for wine can be commercialised, resulting in the conservation of foreign exchange. More research is also needed to evaluate the quality of dried hibiscus and damask rose petals wine matured for a lengthy period of time to commercial wines from other sources. All of the wines were commercially viable. It is determined that the choice of an appropriate yeast strain for the manufacture of Hibiscus wine, along with other vinification methods, is critical because it influences the sensory quality of the wine.

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