

Studies on preparation of wine from Banana

G.R. PANDHRE, SYED IMRAN HASHMI AND J.A. PATIL

● ABSTRACT ●

The present investigation was carried out with objective to prepare of wine from banana fruit by fermentation using wine yeast *Saccharomyces cerevisiae*. The physico-chemical characteristics of banana fruit pulp were analyzed to judge its suitability for preparation of wine. Process of preparation of banana wine was standardized and prepared wine was analyzed for its physico-chemical and sensorial quality attributes. The results revealed that sparkling wine, acidic in taste (titrable acidity (0.96%) with 8.2 per cent of alcohol content could be successfully prepared by using banana fruit as base raw material. Sensorial quality attributes of banana wine were compared with commercial grape red wine. The sensory evaluated rated banana wine quite acceptable as alcoholic beverage and is comparable with commercially available market wine.

KEY WORDS : Banana, Wine, Value added product, Fruit beverage

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● INTRODUCTION ●

Banana belongs to the genus *Musa* and is a climatic fruit made up of peel and edible pulp that has a high nutritional value. Edible banana are vegetative parthenocarpic berries *i.e.* they develop a mass of edible pulp without pollinate. The fruit develop from interior ovary of the female flower. The ovules shriver early but may be recognized in the mature fruit as minute brown flacks in the central part of the edible pulp (Kojima *et al.*, 1992). India is a second largest producer of fruit in the world. Banana is the most important fruit crop of India having great socio-economic significance. It contributes socio-economic significant. It is estimated that around 26.217 million tons of banana was produced in year 2008-09 (Anonymous, 2009). However, more than 22 per cent of banana is wasted due to improper handling and lack of utilization in development of value added products. A large quantity of marketable surplus fruit is available in all banana growing region which need to be processed and be

converted into value added products (Andre *et al.*, 2004). The pulp peel ratio increases during the development of fruit, from 1:1 to 4:1 depending on variety and maturity at harvest (Nigel, 1985). During the storage ripening starch dullness from 20-23 to 1 per cent and the same time the soluble sugar increases from less than 1 to 20 per cent when the mature fruit ripens, the pulp peel ratio increases, partly as a result of water movement from the peel to the pulp associated with an increase of osmotic pressure in the pulp caused by the hydrolysis of starch (Pingyi *et al.*, 2005).

Fruit wines have been made and consumed by man since time immemorial and have been used as therapeutic agents (Mallie and Lipton, 2005). Banana is the most important fruit crop of India having great socio-economic significance. The objectives of this project were to study preparation of wine from banana and also comparative study of physicochemical and sensory quality attributes of banana wine. The present investigation has been undertaken to utilize banana for preparation of wine by using yeast *Sacchromyces cervesiae*, to study the physico-chemical characteristics of banana wine and to study the sensory attributes of banana wine.

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● MATERIALS AND METHODS ●

The present study was carried out at Department of Chemical Technology, at Dr. Babasaheb Ambedkar

Marathwada University, Aurangabad during the year 2009-2010. Materials and methods adopted for the present investigation are presented under suitable headings.

Banana fruits:

The fully ripened banana fruits of Cavendish variety were collected from local market of Aurangabad.

Wine yeast:

The wine yeast, *Saccharomyces cerevisiae* var. *bayanus* was maintained on Potato dextrose agar (PDA) slants.

Fermentation process:

Ripe banana fruits were washed with tap water, cleaned, peeled and pulped. The pulp was homogenized and macerated for 1 min with equal quantity of water. It is further strained to obtain banana juice. Granulated sucrose (18%) was mixed with (59%) water and 50 ppm sodium metabisulphite was added to prevent oxidation and polyphenoloxidase (PPO) browning effects. The mix was adjusted to 24°Brix and pH 3.0 - 3.5 with sugar and citric acid, diammonium phosphate added at 0.50% to the inoculum. Diammonium phosphate was added to adjust the nitrogen concentration of banana juice. The must were inoculated with a *Saccharomyces cerevisiae* yeast stain at the concentration of 0.4% weight by volume. Fermentation was conducted in 2.5 l bottles at desired temperature. Primary fermentation was allowed for 2-3 days and the partially fermented liquid was separated from sediments by siphoning. The liquid was transferred into a fermented and allowed to complete secondary fermentation of 30°C for 4 weeks. The fermentation progress was monitored by measuring the decrease in weight of the fermentation bottles and alcoholic fermentation was considered complete when the weight of bottles remained constant for three consecutive days. Upon completion of alcoholic fermentation, the wine was cooled stabilized at a temperature of -4°C for four days and further allowed to age in long neck 750 ml bottles for 1-2 weeks at 22-25°C before analysis (Chowdhury and Ray, 2007) (Fig. 1).

Physico-chemical analysis:

Waste index, total soluble solids, pH, acidity, moisture, crude protein, crude fat, total ash, total carbohydrates were determined by standard method (A.O.A.C., 1990).

Organoleptic evaluation assay:

Sensory attributes (such as taste, aroma, flavour, colour/appearance and after taste) were evaluated using a 5 point Hedonic scale (where 1 = dislike extremely and

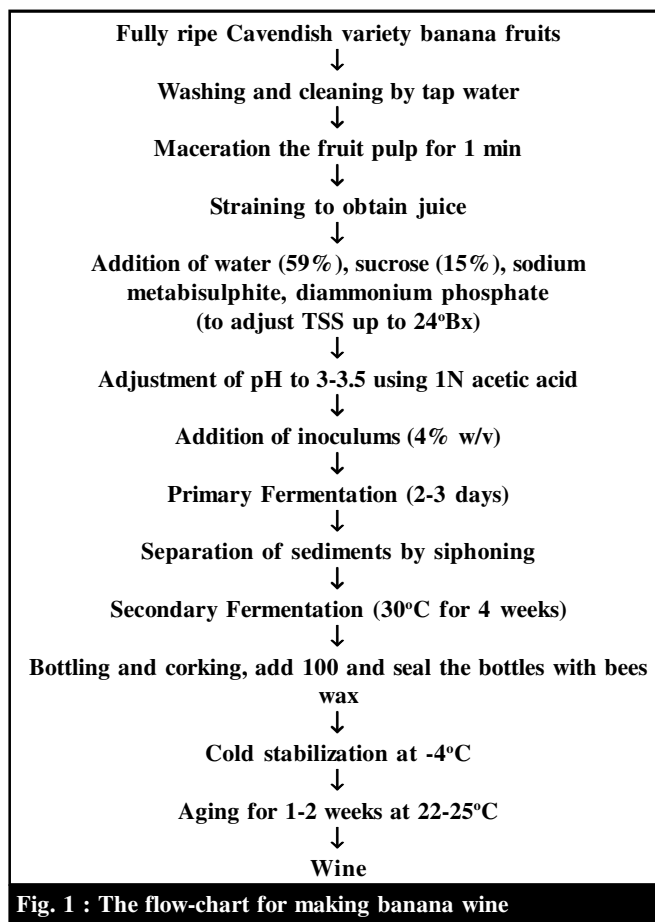


Fig. 1 : The flow-chart for making banana wine

5= like extremely) by 15 panelists (gender: 8 men: 7 women; age group: 20-35) selected from postgraduate students, staff and faculty of several chemical technology related departments who were familiar with wine consumption (Mohanty *et al.*, 2006). Tasters were not allowed to discuss their scores with one another during the evaluation session. The banana wine along with selected commercial brand of grape wine (Figueira) was presented to the trained panel of sensory analysts. The sensory evaluation data were presented as means of the panelist's score. A standard t-test was used to test for the statistical significance of the differences observed between the scores of the two drinks (Cass, 1980).

● RESULTS AND DISCUSSION ●

The result obtained in the present investigation are summarized here with and discussed for their significance. The whole data obtained on the various aspects of banana and banana wine are categorized under the following headings.

Physico-chemical properties of banana:

In order to judge the suitability of banana fruit in

preparation of wine, it is necessary to have a closer look on its physico-chemical composition. The data pertaining to physico-chemical composition of banana are presented in Table 1.

It was observed from Table 1 that pulp of yield of banana was 62.29 per cent which was higher compared to various other fruits justifying its techno-economical feasibility in preparation of wine. The moisture content was found to contain 61.40% moisture. It consisted of appreciable quantities of carbohydrate (36.4%), protein (1.3%), ash (0.7%) and fat (0.2%). The mass fraction of these nutrients obtained in this work was within the similar range reported by many researchers on banana.

Parameter	Observation
Pulp yield (%)	62.29
Colour	Faint yellow
Waste index (%)	37.70
Total soluble solids (°Bx)	24.00
pH	4.54
Acidity (%)	0.44
Moisture	61.40
Carbohydrate	36.40
Protein	1.30
Fat	0.20
Ash	0.70

*Each value is average of five determinations

Analysis of wine:

The produced sparkling banana wine was used to analyze its TSS, titrable acidity, pH and ethanol content. The data on analysis of banana wine are presented in Table 2.

Parameter	Observation
TSS (°Bx)	9.2
Titrable acidity (%)	0.96
pH	3.9
Ethanol (%)	8.2

*Each value is average of five determinations

The results concerning chemical analysis of banana wine showed that significantly higher *i.e.* 8.2 per cent of alcohol content could be obtained in banana wine. The total soluble solids decreased from 24°Bx to the range of 9-10°Bx. The titrable acidity was found to be 0.96 with 3.9 pH. The pH of banana wine was slightly lower than the commercially available wine samples.

Organoleptic evaluation of banana wine:

The organoleptic evaluation of banana wine was carried out at 5 point Hedonic scale and compared to locally available market sample of grape wine (Figueira). The data pertaining to organoleptic evaluation are summarized in Table 3.

Attributes	Banana wine	Commercial grape wine (Figueira)
Taste	4.8	4.5
Aroma	3.8	4.0
Flavour	4.2	4.5
Colour/appearance	3.6	4.8
After taste	3.5	4.0

n=15

*values are means of the panelists scores.

** 1=dislike extremely; 2=like moderately; 3=like much; 4=like very much; 5=like extremely.

Sensory evaluation analysis showed that the panelists rated banana wine superior in terms of taste, may be due to slight sweetness responsible for appealing panelist response. However, the aroma and flavour characteristics were comparable with commercial wine sample. The color of banana wine was found to be slightly dull and scored lower than commercial sample while after-taste characteristic also found in acceptable range. On the basis data generated on organoleptic characteristics, it could be summarized that banana wine was acceptable in terms of its organoleptic quality characteristics.

Conclusion:

On the basis of data generated during present investigation, it was learned that banana fruit could be successfully used in preparation of banana fruit wine. The process of preparation of banana wine was standardized. The physico-chemical analysis of fruit showed higher yield compared to other fruit justifying techno-economical feasibility of banana in wine manufacturing and prepared banana wine is comparable with commercially available grape wine, in terms of its sensorial quality characteristics.

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