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Pharmaceutical Drug Regulatory Affairs Journal
ISSN: 2642-6315

Formulation and Quality Evaluation of Banana Wine

Kapse P, Chandekar A, Bawane A, Patil P, Potey L* and Waghmare S

Department of Pharmaceutical Sciences, Shree Sainath College of Pharmacy, Dawalamethi, India

***Corresponding author:** Potey L, Department of Pharmaceutical Sciences, Shree Sainath College of Pharmacy, Dawalamethi, Nagpur, Maharashtra, India, Email: latapotey@rediffmail.com

Research Article

Volume 6 Issue 1

Received Date: July 31, 2023

Published Date: September 06, 2023

DOI: 10.23880/pdraj-16000140

Abstract

Fruits are very often used for the wine preparation since the beginning of civilization. In recent years emphasis has been given to fruits such as banana for the preparation of wine. Banana is highly perishable in nature, the fermentation is a low energy prevention process to increase a shelf life of this fruits. Banana has good amount of sugar content that makes them suitable substrate for the preparation of wine. The fermenting for analysis of pH, titrable acidity, specific gravity and reducing sugar using standard fermentation of banana wine lasted for 7 days. Physico-chemical parameters were determined during fermentation using standard procedures. Liquor of the fermenting must remove from every 48 hours from standard procedures. The effects showed that specific gravity of the wine used to be discovered to reduced notably as the fermentation progressed. The pH of banana wine at some point of fermentation improved from 3.80 to 4.16 at day to the closing day while the titrable acidity. (% w/v tartaric acid) of the banana wine reduced make bigger from 1.05 to 1.77. The alcohol content of the wine multiplied with time. This work has been focused on formulation and evaluation of banana wine in college laboratory.

Keywords: Banana; Fermentation; Sugar; Wine; Yeast

Introduction

Banana is a very popular fruit due to its low rate and high nutritive value [1]. It is eaten up in fresh or cooked shape both as ripe and raw fruit. Banana has lot of nutritional benefits, and is counselled through medical doctors for patients who have low potassium because of its admiring potassium content [2]. It is a seasonal and quite perishable fruit, which can be available all year round. The massive quantity of bananas and plantains offers the potential for industrial use [3].

India is one of the largest producers of fruits in the world. Fruits are amongst the most necessary foods of mankind as they are no longer solely nutritive but are additionally necessary for the preservation of health. Fruits each in sparkling as nicely as in processed form no longer solely improve the nice of our diet but additionally provide essential substances like vitamins, minerals, carbohydrates and so forth [4]. In India, cultivation of banana fruit is on large scale i.e., 13.90 million lots and handy at cheaper rate in market. Maharashtra is the country's greatest producer of bananas; growers right here have been facing issues like fluctuation in fees and incidence of ailment [5]. Fermenting banana juice is regarded to be a pleasing capacity of utilizing surplus and overripe bananas. There is a paucity of records in the literature on production of liquids the usage of ripe bananas [6]. Thus, the objective of this work used to be to produce and evaluate the high-quality of wine made from banana juice.

Profile of Banana

Banana (*Musa sapientum*) is a valued fruit across the world due to its flavour, high dietary value, and availability at some stage in the year. The bananas are abundantly cultivated

in growing nations of Asia, Africa and Latin America which can bear fruit all-round the year presenting a convenient supply of energy for humans [7]. Bananas have a lot of dietary benefits and a better desire for human beings suffering from potassium deficiency because of its superb potassium content. Potassium is an important aspect of cell and body fluids that helps control heart beat and blood pressure, countering terrible results of sodium [8]. Bananas' flavour is due, amongst different chemicals, to isoamyl acetate which is one of the important constituents of banana oil. Wine is an alcoholic beverage usually made from fermented fruit juice [9]. Maharashtra share is 58 As many as 30 wineries are in Nasik, eleven in Pune, 10 in Sangli, 3 in Solapur, 3 in Buldhana and one in Osmanabad. Maharashtra registered around 59.84 per cent increase in wine manufacturing to 2.11 crore litres [10].

Objective of the Study

The general objective is to produce wine from banana and the specific objectives is to evaluate the qualities of the wine. The production of alcohol from banana juice which use as complete replacement of malt in alcohol production by utilizing pure culture of Saccharomyces cerevisiae as fermenting organism. The main objective of the study is to extraction of the banana juice with suitable dilution with water, obtaining juice of desired consistency and followed by fermentation of the juice by addition of inoculums in aseptic condition. To evaluate the qualities of the wine and to carry out or monitor yeast count during fermentation. To present a study about banana in post-harvest handling, technology in banana, end products of banana, banana diseases.

Material and Methods

Raw Material

The various raw materials and chemicals that are required for the wine production are given as: Banana fruit and pulp, Yeast (*saccharomyces cerevisae*), pectinase enzyme, ascorbic acid, Distilled water, Spirit or Acetone, Sucrose and Maltose, Agar and Nutrient broth, Preservative or antioxidant (sodium metabisulphate), fermenter (5 L quadruple glass bioreactors (GBCN-5C, Zhenjiang East Biotech Equipment and Technology Co., Ltd., Zhenjiang, Zhenjiang, China), Refractometer (Digital Abbe Refractometer, S-9293), Thermometer (glass thermometer, 300^0C) , Hydrometer (BS718 M50 at 20C Hydrometers, for specific gravity), Grinder, Hot air oven, Autoclave(Labtron, LVA-B15), Refrigerator, Centrifuge separator, Microscope, Conical flask, Petri plate, Measuring cylinder, Beaker, Nichrome wireloop, Burner etc.

Preparation of Banana Wine

The methods include the following steps. Cleaning banana, peeling, slicing, protecting colour, juicing, treating with pectinase, centrifuging, separating, adjusting, the components inoculating yeast, conducting, primary fermentation, aging, filtering, bottling, and sterilizing.

Preparation of Juice

Mature, ripe, healthy bananas (*Musa Paradisiaca*) were purchased from a local market Nagpur. The fruits were classified as light yellow. Each of the banana fruits was washed, hand peeled, and sliced with a stainless-steel knife. The slices were ground into the grinder and the pulp was fermented for 7day, after these processes the pulp were centrifuge in the centrifugal machine and juice was produced [11].

Fermentation of Juice

The treated juice (40 ml) was added to the glass aspirator jars. Jar was seeded with 3% (V/V) of the 48h yeast inoculum. The jars were closed with rubber stoppers fitted with fermentation lock. The mixture was incubated at room temperature (30 ± 2°C) for 7days. Titratable acidity (TA), pH, soluble solids (SS), specific gravity (SG) and temperature were monitored daily during the fermentation. Racking was done for the fermenting Juices when gas evolution diminished. The matured wines gas evolution stopped. The wines were then transferred into wine bottles, pasteurized (60 ˚C, 30 mins) and stored in a refrigerator (10 ± 2°C) [12].

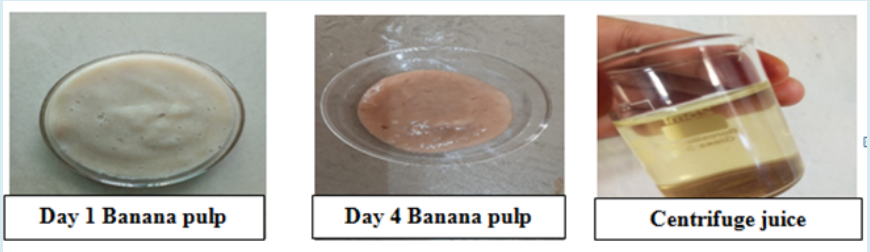

Figure 1: Fermentation view.

Preparation of Yeast Culture

Two-gram dry commercial baker's yeast (*Saccharomyces cerevisiae*) were dissolved in 100 ml banana juice preheated at 3°C. The mixture was held in a culture propagating bottle at 30 ± 2°C for 48 h.

Clarification

At the quilt of the ageing period, some wine must have clear naturally, for others artificial clarification may be necessarily, this is completed by including fining agent, which will react with tannin, acid, proteins, and so on to supply coagulum's which settles [13]. Fining is used to have an effect on a fast clearing of wines which will no longer clear naturally, to cast off substance which would render the wine unstable after bottling.

Packaging/Bottling

Wines can also be bottled before or after getting old relying on the producer. Most wines which are bottled before ageing are the sparkling wines and the commonly require filtration earlier than the ultimate bottling.

Methods of Evaluation

Soluble solids were determined using an Abbe refractometer. Moisture was determined by oven drying at 105°C. The pH value determined by standard pH meter by preparing buffer solution. Taken 10ml of wine in a beaker and electrode immersed. The measure pH is 3.57 [14].

Determination of Reducing Sugar

The quantitative estimation of decreasing sugar of the juice used to be decided the use of the method described by using [15]. 1 mL of 3,5-Dinitrosalicyclic acid (DNS) is added to 1 mL of supernatant of wort (sample) in a take a look at tube and the combination heated in boiling water for 10 minutes. The test tube is cooled rapidly in tap water and the quantity adjusted to 12 mL with distilled water. A blank containing 1 mL of distilled water and 1 mL of DNS is additionally prepared. The Optical Density (OD) of pattern is examine in opposition to the blank in a Spectrophotometer at 540 nm absorbance. The concentration of reducing sugar is estimated from glucose popular [16].

Determination of Specific Gravity

50 mL density bottle was absolutely cleaned with distilled water, dried in an oven for 500C and allowed to cool. The weight of the cooled dried bottle (W1) was recorded. The dried density bottle was once crammed with deionized water and floor of the bottle was cleaned with a cotton wool and weighed (W2). The density bottle. was emptied and cleaned twice with 10 mL of the juice thereafter the bottle was filled to the brim with the "must" and the bottle cleaned with cotton wool and weighed (W3). The specific gravity (Kg/m^3) was calculated [17].

Determination of Titrable Acidity

This used to be determined by the titration.1% of aqueous alcoholic phenolphthalein as indicator used to be brought to 200ml of distilled water. It was titrated with 0.1M of NaOH. Titration was stopped when a faint but particular red coloration seemed andthe titre price was once cited that served as the initial titre. 5 mL of the have to use to be introduced to the neutralized solution. The identical 0.1M NaOH used to be used to titrate it. The titration was stopped at the look of faint, but precise red colour. The titre was taken. This served as the closing titre. The titratable acidity used to be calculated with reference to tartaric acid [18].

Determination of Alcoholic Content

The refractometer method used to be used in determining the alcohol content. An easy dry applicator was used to region 2drops of the pattern (must i.e., earlier than fermentation) on the prism of the refractometer and the price (original gravity) of the refractive index taken. Also, after fermentation, 2drops of the sample used to be utilized on the prism of the refractometer and the cost (total gravity) was taken. The refractive index of the pattern used to be taken on two days interval of time [19].

Determination of Temperature

An easy thermometer and measuring cylinder were once used for temperature reading. about 50ml of the sample was once used.

Results and Discussion

Organoleptic Evaluation

The organoleptic characteristics such as colour, odour, taste, clarity, flavour and the overall acceptance the sample were evaluated on the 21st day.

S.No.	Organoleptic Properties	Results
1	Colour	Light yellow
2	Clarity	Clear
3	Taste	Slight taste
4	Odour	Likely moderate
5	Flavour	Light fruit

Table 1: The organoleptic characteristics and results.

The find out about aimed at evaluating the qualitative performance of wine The result of the banana wine produced by way of the fermenting with yeast traces remoted from banana (*S. cerevisiae*) indicates excessive rate of alcoholic manufacturing at the give up of day 21. Throughout the duration of fermentation, pH of the need to was within the acidic vary 3.60 to 4.16. Indicate a gradual decrease in the pH as the fermentation time will increase and increased at the end of fermentation. The end result of titrable acidity carried out on the pattern as shown in table shows that the titrable acidity levels from 1.05 at zero day to 1.77 at day 21 in the fermenter. Therefore, the titrable acidity will increase as fermentation time increases.

Temperature Result for Banana Wine

Days of Fermentation	Temperature
Day 1	27°C
Day 2	28°C
Day 3	38°C
Day 4	43°C
Day 5	26°C
Day 6	28°C
Day 7	27°C

Table 2: Temperature Result for Banana Wine.

Physicochemical Properties

No. of Days	pH	Reducing Sugar (mg/ml)	Titrable Acidity (%w/v)	Specific gravity (kg/m^3)	Alcohol Content (%v/v)
0	4.2	0.25	1.04	1.009 ± 0.0012	0
2	3.9	0.23	1.07	1.027± 0.0042	0.4
5	3.7	0.13	1.13	1.022± 0.0034	2.4
7	3.6	0.6	1.24	1.020± 0.0058	4.9
9	3.9	0.2	1.32	1.014± 0.0035	5.7
14	4.2	0.1	1.47	0.999± 0.0085	7.6

Table 3: Physicochemical Properties.

Wine Absorbance Peak

Absorbance	Nanometre
4	254

Table 4: Wine Absorbance Peak.

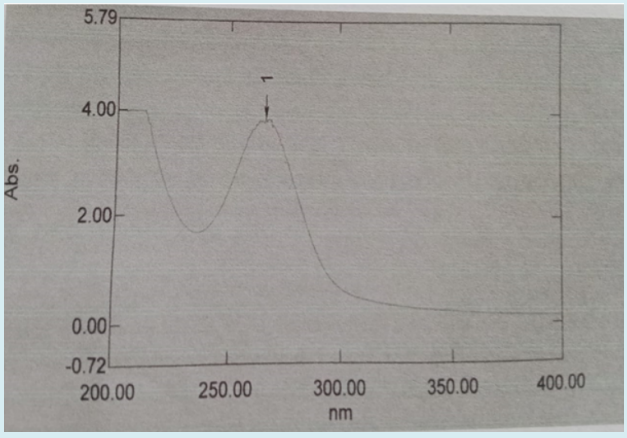

Figure 2: Absorbance range of wine by UV-Vis Spectrophotometer.

Conclusion

It may be concluded that a 10-day fermentation of banana juice produced a good quality wine. Banana wine is very nutritious and easy to produce and could then compete in the market with other wines because of its flavour, taste, aroma and the successful production of using indigenous fruits as substrates for wine production and the efficiency of locally isolated yeast *Saccharomyces cerevisiae* strains. Banana wine has a lot of nutritional benefits, vitamins including B5, B6, C, A are all present in banana wine and this makes it one of the high-ranking beverages over other alcoholic ones. Vitamin A helps in restrain of eye sight. Sensory evaluation shows that shade and taste was slightly good whilst odour and palatability was moderately good. The typical acceptability was moderate.

Acknowledgement

Authors are very much thankful to Principal and Management of Shree Sainath College of Pharmacy, Dawalameti, Nagpur for providing research facilities for the completion of this research work. We are also thankful to

HOD, Department of Pharmaceutical Sciences, Nagpur for research assistance.

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