Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2017; 6(4): 591-595
Received: 20-05-2017
Accepted: 21-06-2017

Golda Maria Syriac
Department of horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, UP, India

Saket Mishra
Department of horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, UP, India

Vipin Masih Prasad
Department of horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, UP, India

S Saravanan
Department of horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, UP, India

Samir Ebson Topno
Department of horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, UP, India

Correspondence
Golda Maria Syriac
Department of horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, UP, India.

Response of different sources of sugar on production and quality analysis of banana (*Musa paradisiaca*) peel wine CV. Grand Naine

Golda Maria Syriac, Saket Mishra, Vipin Masih Prasad, S Saravanan and Samir Ebson Topno

Abstract
The present study was carried for the evaluation of Effect of different sources of sugar on production and quality analysis of banana peel wine. The pulp was maintained to 29°Bx and was inoculated with *Saccharomyces cerevisiae* for primary fermentation. The secondary fermentation was allowed till the 41st day. Wine was analyzed for chemical parameters such as TSS, Acidity, Specific Gravity, Alcohol content and pH on fifteen days interval after fermentation and aging ie;41st day. TSS varied from 17.9°Bx to 10.2°Bx in case of table sugar and also Acidity from 0.72% to 0.94%, Specific Gravity from 1.080 to 0.831, pH ranges from 4.4 to 3.80 and Alcohol content from 7.0% to 8.6% (v/v). In the jaggery used wine, TSS raged from 18.1°Bx to 9.8°Bx, Acidity ranges from 0.58 to 0.86%, pH from 4.5 to 3.9, Specific gravity from 1.026 to 0.77 and Alcohol content obtained from 6.3% to 7.5% (v/v). In sucrose used wine, TSS raged from 17.8°Bx to 10.2°Bx, Acidity ranges from 0.61 to 0.94%, pH from 4.4 to 3.84, Specific gravity from 1.075 to 0.83 and Alcohol content obtained from 7.3% to 8.3% (v/v)**. Sensory evaluation was done with different types of consumers. The wine was accepted generally.

Keywords: Banana peel wine, alcohol, fermentation of banana, bevearage, quality analysis

Introduction
Bananas (*Musa paradisiaca*) are an important staple starchy food of many tropical populations. Banana at 81.3 million metric tonnes (Mt) in 2007 was the second largest produced fruit after Citrus, contributing about 16% of the world's total fruit production (FAO 2009) [6]. India is a second largest producer of fruit in the world. Banana is one of the most important food crops of the world which is consumed extensively throughout the tropics which it is grown and also valued in the temperate zone for its flavour, nutritional value, and availability throughout the year.

Banana is a very popular fruit due to its low price and high nutritive value. It is consumed in fresh or cooked form both as ripe and raw fruit. Banana has lot of nutritional benefits,and are suggested by doctors for patients who has low potassium because of its impressive potassium content.

** (v/v) volume/volume

All parts of the banana plant have medicinal applications: the flowers are used for bronchitis and dysentery and on ulcers, cooked flowers are given to diabetics patients, the astringent plant sap in cases of hysteria, epilepsy, leprosy, fevers, hemorrhages, acute dysentery and diarrhea, and it is applied on hemorrhoids, insect and other stings and bites; young leaves are placed as poultices on burns and other skin afflictions; the astringent ashes of the unripe peel and of the leaves are taken in dysentery and diarrhea and used for treating malignant ulcers; the roots are administered in digestive disorders, dysentery and other ailments; banana seed mucilage is given in cases of diarrhea In India. Antifungal and antibiotic principles are found in the peel and pulp of fully ripe bananas. The antibiotic acts against Mycobacteria. Norepinephrine, dopamine, and serotonin are also present in the ripe peel and pulp. The first two elevate blood pressure; serotonin inhibits gastric secretion and stimulates the smooth muscle of the intestines. Peel and Pulp have both antifungal and antibiotic components. These structures have also been identified as containing the neurotransmitters norepinephrine, and dopamine. (Sampath Kumar *et al.* 2012) [5]

Peels of many fruits are under research due to its natural sources of antioxidants which are rich in compounds with free radical scavenging activity. Fruit peels contains non-nutritional antioxidants, including flavonoids, flavones, and polyphenols.

Food Processing is highly important to minimize postharvest loss and to improve connections between industries and agriculture.

The processing industries of banana and plantain into chips, flour, dried pulps, jam, spirits distilled from wine or beer, are growing slowly in banana producer countries, meanwhile the important volume of peel generated is source of interest and cannot be regarded as ‘‘waste’’ (Happi Emaga, Herinavalona Andrianaivo, Wathelet, Tchango Tchango, & Paquot, 2007; Enwefa, 1991) [1]. It is observed that there is a tremendous scope for enhancing its processing. According to the National Cancer Standard Institute, banana peel extract is classified as non-toxic to normal human cells; therefore, it can be safely utilized as a natural source of antioxidants.

Wine is a product of alcoholic fermentation by yeast of the juice of any fruit with a good proportion of sugar. Wine is one of the most recognizable high value added products from fruits. Wine manufacture is challenging in which marketable product can be obtained, but the processes involved in its production are relatively straight forward (Amerine *et al*.1980) [2].

It is primarily the alcohol in wine that provides the calories. One gram of alcohol provides 7 kilocalories of energy (Carol Brannond, 2004) [3]. 8-18% of ethanol (%v/v) can inhibit bacteria, yeast and mould growth but effectiveness depends upon different physical and environmental factors (Sonia et al., 1992) [4]. There are many beneficial effects of wine consumption due to phenolics and alcohol in wine, which protects human body from free radical attack and increase HDL level in the body (Joshi, 1997). In wines, alcohol is a macro nutrient and is an energy source, capable of providing calories for all essential biological activities of the human cells, energy for physical work and thermogenesis (Bisson, 1995). It consists of water, alcohol, pigments, esters, vitamins, carbohydrates, minerals, acids, and tannins with medicinal and therapeutic value (Patil *et al*., 2005). Banana peel has 79.2g/100g moisture, 0.83g/100g protein, 0.78g/100g fat, 2.11g/100 minerals, 1.72g/100g fibres and 5.0g/100g carbohydrates Kotecha and Desai (1995). So thus this present study has done to evaluate the effect of different sources of sugar on production and quality analysis of banana peel wine.

Materials and Methods

The research work entitled- response of different sources of sugar on production and quality analysis of banana peel wine was conducted at Post-harvest laboratory, Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, UP. Three treatments having three replications were analysed in Completely Randomised Design.

Materials Used:

Banana Fruit Peel (Well ripened Banana fruits colleceted from local market of Allahabad (Variety-Grand Naine)), sugar, sucrose, Jaggery, yeast (*Saccharomyces cerevisiae*) and water.

Preparation of Juice:

Well ripened banana fruits purchased from local market of Allahabad were peeled, cut the peel into pieces and boiled by adding water for 25 minutes. Allowed it to cool and strained the juice obtained.

Treatments Detail:

Three treatments (Three sugar forms) were used and they are replicated thrice for evaluation.

T_1: peel extract + sugar + yeast
T_2: peel extract + jaggery+ yeast
T_3: peel extract +sucrose + yeast

Fermentation of Banana Juice:

The banana peel extract is mixed with different forms of sugar such as Table sugar, Jaggery and Sucrose respectively and was adjusted to 29°Brix. Three gram Saccharomyces cerevisiae was inoculated to 1l of above each combination. They were kept three days for primary fermentation at 30°C and then transferred into 2 l glass bottles and were kept for secondary fermentation for 21 days. Then after the wine was filtered and kept for aging in 750 ml long necked glass bottles at room temperature.

Analytical Methods

Physiochemical parameters such as TSS, Acidity, Specific Gravity, Alcohol Content and pH was evaluated to check the quality of banana wine produced by using different sources of sugar. The TSS content was determined using hand refractrometer. The pH was determined using, digital pH meter. The acidity was determined by titration. The alcohol content was determined by using hydrometer and the specific gravity determined using a Brix hydrometer. Analysis was done from 41st day with a 15 days interval followed by 41, 56 and 71 days.

Statistical Analysis

Statistical analysis was done in Completely Randomized Design (CRD) for Physio–chemical analysis and sensory evaluation. The variance analysis using the Statistics software WASP (web agri stat package) was used to compare the averages for different variables studied. The test was considered statistically significant if $p < 0.05$.

Sensory Evaluation:

Banana wine produced using three sugar sources was compared using 5-point hedonic scale were noted as like extremely to dislike extremely. A panel of 5 judges of different gender and different age groups tested it organoleptically 3 times after fermentation and aging followed by 41st, 56th and 71st days.

Results and Discussion

Phsico-chemical analysis was done and the following observations were noted:

Table 1: Physiochemical properties of banana peel wine using Table sugar**:**

Days	Chemical Parameters				
	Tss(°Bx)	Acidity (%)	Alcohol%(V/V)	Ph	Specific Gravity
41st Day	17.967±0.05	0.77±0.01	7.033±0.05	4.433±0.05	1.081±0.01
56th Day	13.1±0.05	0.887±0.01	7.333±0.05	4.067±0.05	0.94±0.01
71st Day	10.233±0.05	0.917±0.01	8.533±0.05	3.8±0.05	0.83±0.01

Table 2: Physiochemical properties of banana peel wine using Jaggery:

Days	Chemical Parameters				
	Tss(°Bx)	Acidity (%)	Alcohol%(V/V)	Ph	Specific Gravity
41st Day	18.033±0.05	0.59±0.01	6.333±0.05	4.567±0.05	1.027±0.01
56th Day	14.033±0.05	0.72±0.01	6.633±0.05	4.133±0.05	0.79±0.01
71st Day	9.9±0.05	0.853±0.01	7.5±0.05	3.967±0.05	0.773±0.01

Table 3: Physiochemical properties of banana peel wine using Sucrose:

Days	Chemical Parameters				
	Tss(°Bx)	Acidity (%)	Alcohol%(V/V)	Ph	Specific Gravity
41st Day	17.767±0.05	0.623±0.01	7.333±0.05	4.333±0.05	1.071±0.01
56th Day	13.767±0.05	0.883±0.01	7.967±0.05	3.9±0.05	0.945±0.01
71st Day	10.233±0.05	0.923±0.01	8.3±0.05	3.84±0.05	0.84±0.01

There are changes in the physico-chemical properties of banana wine produced with different sugar sources. Also the time determines the quality properties.

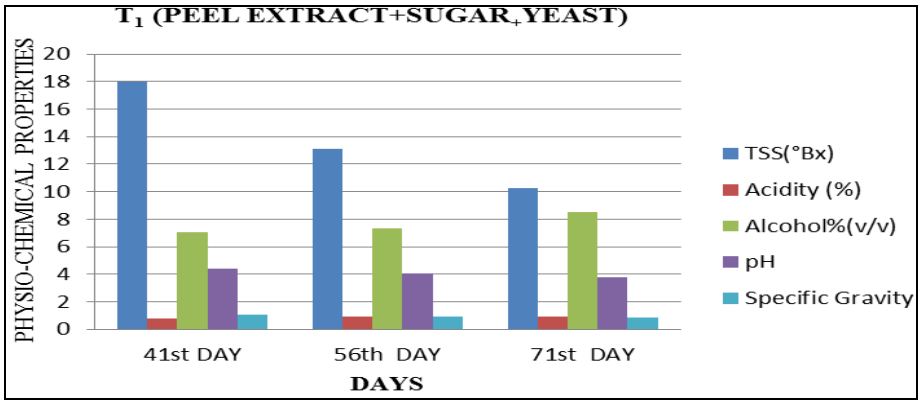

Fig 1: Physio chemical changes of wine using Table sugar

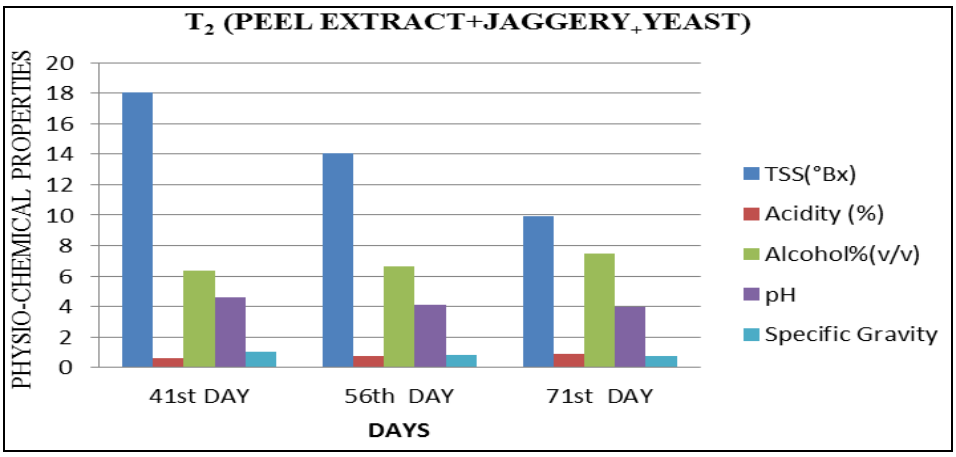

Fig 2: Physio chemical changes of wine using Jaggery during different time intervals

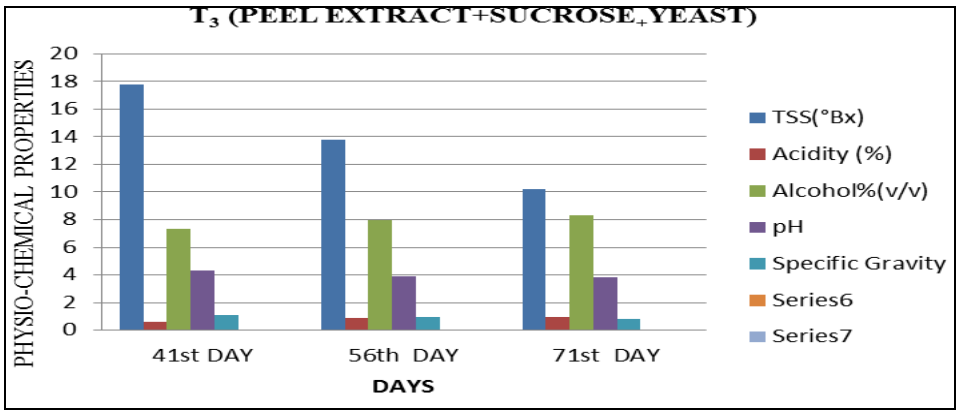

Fig 3: Physio chemical changes of wine using Sucrose during different time intervals

The chemical composition of banana peel wine using different sources of sugar including Table sugar, Jaggery and sucrose is shown in figf. 1, 2 and 3. In three of sugar sources TSS shows a reducing rate and acidity increased during the aging of wine. Alcohol content increases and thus the specific gravity and pH decreases. It is shown that the three sources of sugars are good for the preparation of wine but still the jiggery will affect the colour of wine.

The Titrable Acidity increased and pH decreased as the fermentation progressed.TSS and specific gravity decreased and alcohol content increased during fermentation. During aging TSS, Titrable Acidity, Specific gravity decreased. In wines, alcohol is a macro nutrient and is an energy source, capable of providing calories for all essential biological activities of the human cells, energy for physical work and thermogenesis.

Fig 4: Banana Peel Wine produced using Table sugar, Jaggery and Sucrose

Sensory Evaluation

Sensory evaluation was done with consumers of different age group and different gender**.** It was done after aging of wine followed by 41st, 56th and 71st days. Thus obtained points are analysed and found out the overall acceptability of three treatments and the best treatment accepted mostly.

Table 4: Mean score of the wine using different sugar sources by Degustation

Treatments	Sensory Attributes					
	Taste	Colour	Appearence	Flavour	Aroma	Overall Acceptability
T1 (Peel Extract+Sugar+Yeast)	4.0	4.1	4.0	4.3	4.2	4.12
T2 (Peel Extract+Jaggery+Yeast)	3.9	3.9	4.0	4.0	4.0	3.94
T3 (Peel Extract+Sucrose+Yeast)	4.3	4.3	4.2	4.4	4.3	4.3

Overall acceptability was not seen significantly different and accepted by the consumers. Comparatively wine obtained using sucrose has obtained as the best treatment. The sensory evaluation was done to assess the overall acceptability of wine after fermentation and after aging after 41 days and then within in a 15 days interval following 41, 56 &71th day. Overall acceptability was high for the third treatment (T3: Fruit Extract+ Sucrose +Yeast) and the flavor and appearance was also better for the wine produced using sucrose. Taste of wine produced using jaggery was not accepted by all because of the superior taste of jaggery. So it has obtained that the wine produced using sucrose was accepted more by the consumers.

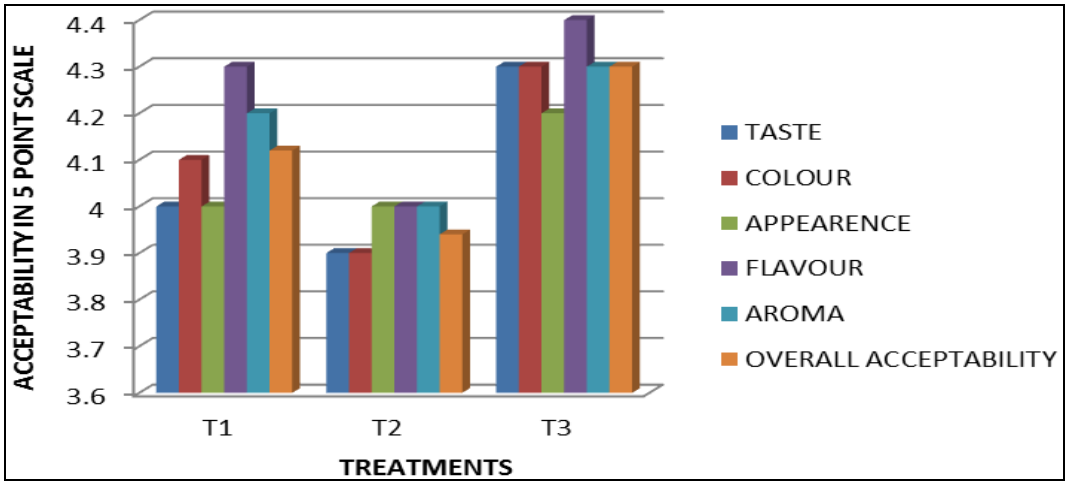

Fig 5: Sensory evaluation results of three treatments

Conclusion

Due to its pleasant flavour and taste, Banana peel wine is even liked by the ladies and children's. So that the under-utilized banana peel can be utilised and also we will get health benefits, as our world is suffering with various health issues, it raises blood pressure and too many other problems. Drinking wine will reduce stress and lowers blood pressure.

It was concluded that the Banana Peel Wine can be prepared by using three sources of sugar including Table sugar, Jaggery and Sucrose. They are qualified in physicochemical evaluation and also in the sensory evaluation. And also the medicinal properties direct us to consume little amount of wine for many health problems. Thus it was accepted generally by the consumers. So I recommend this experiment for the fast growing world for its tension free future.

References

1. Happi Emaga T, Herinavalona Andrianaivo R, Wathelet, B, Tchango Tchango J, Paquot M. Effects of the stage of maturation and varieties on the chemical composition of banana and plantain peels. Food Chemistry. 2007; 103(2):590-600.
2. Amerine MA, Berg HW, Kunkee, Singleton VL, Webb AD. The Technology of Wine Making, 4th edition, AVI Publishing Company, Inc. West port, Connecticut, USA, 1980.
3. Carol Brannond. Is wine a functional food. Today's dietitian. 2004, 1-6.
4. Sonia A, Ballesteros JC, Juan PB. Antibacterial effects and cell morphological changes in S. aureus subjected to low ethanol concentration. Journal of Food Science. 1992; 58(2):435-438.
5. Sampath Kumar KP, Debjit Bhowmik, Duraivel S, Umadevi M. Traditional and Medicinal Uses of Banana. Journal of Pharmacognosy and Phytochemistry**.** 2012; 3(1):51-60.
6. FAO. 2009. www.fao.org.
7. Akubor PI, Obio SO, Nwadomere KA, Obiomah E. Production and quality evaluation of banana wine. Plant Foods for Human Nutrition. 2003; 58:1-6.
8. Anhwange BA. Chemical composition of *Musa sapientum* peels. Journal of food Technology. 2008; **6**(6):263-266.
9. Amit sakharam patil. Development technology of banana wine. International journal of processing and post-harvest technology. 2011; 2(2):90-92.
10. Gavimath CC, Kalsekar DP, Raorane CJ, Kulkarni SM, Gavade BG, Ravishankar BE, Hooli VR. Comparative analysis of wine from different fruits. International Journal of Advanced Biotechnology and Research. 2012; 3(4):810-813.