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Effect of must dilution on fermentation of banana fruit pulp into white wine

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Abstract
Preparation of a wine from the banana fruits was undertaken and effect of dilution on fermentation of banana wine was investigated. Must was prepared from healthy and ripen banana fruits which was inoculated with 2%, (v/v) of yeast inoculum followed by fermentation. Physicochemical analyses of wines were then performed. Banana must with 1:0 and 1:1 dilution gives wine with 14% alcohol.

Keywords: banana wine, must dilution, fermentation

Introduction
Banana fruit has thick pulp and thus could not be fermented into desired product. Thus before fermentation the banana pulp must be homogenized and diluted with appropriate proportion of water. Effect of dilution and maturation on physico-chemical and sensory quality of jamun (Black plum) wine was reported by Joshi *et al.*, (2012) [8]. Ranjitha, *et al.*, (2015) [10] standardized the process for production of banana wine by diluting the pulp in various ratios with water. Various reports on fermentation of banana wine are increasing day by day (Onwuka and Awam, 2001; Akubor *et al*., 2003; Cheirsilp and Umsakul, 2008; and Isitua and Ibeh, 2010; Awe *et al*., 2013) [9, 1, 6, 4]. However as per our knowledge, research is lacking on effect of dilution of banana must in various proportions on fermentation of banana wine needs to be studied in detail. In view of this the present study was conducted to study the effect of dilution of banana must on fermentation of banana wine.

Material and Methods
Preparation of banana must
The fully ripened and undamaged banana fruits were purchased from the Local market of Nanded, Maharashtra during the month of May, 2015. The fruits were brought fresh to the laboratory and processed within two days.
Must was prepared from healthy and ripen banana fruits. Banana fruits were washed with tap water and peeled manually. Pulp from each fruit was weighed, sliced into small pieces with a stainless steel knife and homogenised in a kitchen mixer. Pulp homogenate mixed with two part of hot boiled water (1:2, pulp: water (w/w)). Potassium metabisulfite (100 mg/L) was added to prevent the growth of unwanted microorganisms (Considine and Frankish, 2014) and kept for cooling at room temperature (26-28°C) for 2 h. The juice thus obtained was treated with 0.01 % (w/w) pectinase enzyme. Then this must was kept overnight for pectin hydrolysis at room temperature. This must was stored at 4 °C until required.

Effect of dilution
To study the effect of dilution on physicochemical characteristics of wine the must was diluted in following proportion with water; 1:0, 1:1, 1:2, 1:3 and 1:4 (must : water, v/v). The final volume of each mixture was 400 ml. Total soluble solids (TSS) of each treatment were adjusted to 20°Brix using cane sugar. pH was adjusted to around 3.40 using citric acid and diammonium phosphate was added to each flask at a concentration of 100 mg/L.

Fermentation process
For preparation of inoculum 6 g of Baker's yeast (*Saccharomyces cerevisiae*) was added to 300 ml of banana juice and incubated at 28-30 °C for 48 h. The must from each treatment was inoculated with 2 %, (v/v) of inoculum containing ~2.9×10^6 cfu/ml. The yeast cell count was done by using spread plate method on yeast extract peptone dextrose agar. Fermentation was carried out at room temperature (25-30 °C). Fermentation was allowed to complete for 24 d. Physicochemical analyses of wines were then performed.

Physico-chemical analysis
The pH of the must and wine was measured with a digital pH meter (Systronics, India), pre-calibrated with buffers of pH 4.0 and 7.0. Titratable acidity was determined by titrating with 0.1 N NaOH as described by AOAC and alcohol % was determined by using alcohol hydrometer as per the method described by Amerine and Ough (1980) [2]. Total soluble solids (TSS) were determined using Abbey's refractometer (0–32) in terms of °Brix (Jacobson, 2006) [7]. Volatile acidity was determined by titration of distillate samples and expressed as percent of acetic acid per 100 ml of wine.

Results and Discussion
Physicochemical characteristics of must
In present study to facilitate optimum fermentation,

homogenised pulp was diluted with water in different ratio with water before must preparation. Specific gravity of the must was found to be in similar range (Table 1). Its value was highest in 1:0 dilutions. pH and soluble solids were respectively ranged around 3.50 and 20 °Brix, after pH and soluble solid adjustments. Titratable acidity was decreased with increased in dilution level.

Table 1: Effect of dilution on physicochemical properties of banana must

Parameter	1:0	1:1	1:2	1:3	1:4
SG	1.0446	1.0425	1.0407	1.0432	1.0427
pH	3.50	3.56	3.56	3.53	3.54
Soluble solid(°Brix)	20.2	20	20	20	20.4
TA (% tartaric acid)	0.45	0.3	0.26	0.23	0.21

Effect of dilution of must on banana wine

It was observed that pH of the fermented wine showed direct correlation with dilution (Table 2). With increased in dilution the decreased in pH was observed and it was in the range of 3.02 to 3.45. This was in contrast to acidity of the wine. The titratable acidity was ranged from 0.66 to 0.86 as % tartaric acid depending on the level of dilution used. As the dilution level increased the quantity of fruit juice decreased and the acidity was also found to be decreased. Volatile acidity was found to show no direct relation with dilution and observed in the range of 0.024 to 0.042 %. Its value was highest in 1:2 dilution and lowest in 1:1 dilution.

Table 2: Effect of dilution of must on physicochemical properties of banana wine

Parameter	Dilutions				
	1:0	1:1	1:2	1:3	1:4
SG	0.996	0.9951	0.9999	1.0086	1.0086
pH	3.45	3.29	3.18	3.09	3.02
Soluble solid (°Brix)	6.4	6.2	7.6	11	11
TA (% tartaric acid)	0.86	0.75	0.79	0.71	0.66
VA (% acetic acid)	0.027	0.024	0.042	0.033	0.033
Alcohol %	14	14	12	10	10

Specific gravity of the wine was increased with dilution and ranged between 0.9951 and 1.0086. The lowest dilution 1:0 had slightly higher specific gravity than its one fold dilution. The TSS of different banana wines was ranged from 6.2 to 11 °Brix. The wide variation in TSS of banana wine was due to the differences in fermentation ability of the musts. The alcohol percent of different wines correlated with their respective rates of fermentation from 1:1 to 1:3 dilutions in the range of 10 to 14 (%v/v). Alcohol percent was highest (14 %) in 1:0 and 1:1 dilution and lowest (10%) from 1:3 dilutions. Although the TSS (°Brix) of all the musts was kept at approximately 20 °Brix, the quantity of ethanol differed largely between the different dilutions.

Ranjitha *et al* (2015) [10] reported the effect of dilution on physicochemical properties of banana wine and found that 2:1 (juice: water) diluted juice was the best fermentative substrate for banana wine fermentation. The wine produced by them had pH 4.07, total acidity (%) 0.75, alcohol (%) 11.67 and volatile acidity (%) 0.04. Joshi *et al* (2012) [8] also studied the effect of dilution on jamun wine and in contrast to our results they found that alcohol % was increased and total soluble solid was decreased with increased in dilution of must. Decreased in titratable acidity was reported by them with increase in dilution.

Conclusion

Dilution of banana must results into wine with different concentration of ethanol. Higher dilution gives low alcohol percent in banana wine.

References

1. Akubor PI, Obio SO, Nwadomere KA, Obiomah E. Production and quality evaluation of banana wine. Plant Food Human Nutri. 2003; 58(3):1-6.
2. Amerine MA, Ough CS. Methods for analysis of musts and wines. John Wiley & Sons, United States, 1980.
3. AOAC. Official methods of analysis. Association of official analytical chemist, 13th Edn. Washington DC, 1980.
4. Awe S, Eniola KIT, Kayode-Ishola TM. Proximate and mineral composition of locally produced pawpaw and banana wine. Am. J Res. Commun. 2013; 1(12): 388-397.
5. Cheirsilp B, Umsakul K. Processing of banana-based wine product using pectinase and α-amylase. J F. Proc. Eng. 2008; 31(1):78-90.
6. Isitua CC, Ibeh IN. Novel method of wine production from banana (*Musa acuminata*) and pineapple (*Ananas comosus*) wastes. Afr J Biotechnol. 2010; 9(44):7521-7524.
7. Jacobson JL. Introduction to wine laboratory practices and procedures. Springer Science & Business Media, New York. 2006, 164-166:269-271.
8. Joshi VK, Sharma R, Girdher A, Abrol GS. Effect of dilution and maturation on physico-chemical and sensory quality of jamun (Black plum) wine. Ind. J Nat. Prod. Res. 2012; 3(2):222-227.
9. Onwuka UN, Awam FN. The potential for baker's yeast (*Saccharomyces cerevisiae*) in the production of wine from banana, cooking banana and plantain. F. Serv. Technol. 2001; 1(3-4):127-132.
10. Ranjitha K, Narayana CK, Roy TK. Process standardization and quality evaluation of wine from Cavendish banana (*Musa*, genome AAA) cv. Robusta. Ind. J Hort. 2015; 72(1):153-155.