Research Paper

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Role Of Emotional Intelligence On Conflict Management- Pre Service Teachers Perspective

Biotechnology

KEYWORDS : Emotional intelligence, conflict management, Emotional experience and incompatibility

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ABSTRACT

Emotional intelligence is a learned ability to identify, understand, experience, and express human emotions in healthy and productive ways. Emotional experience and expression are unique to each teacher and student. Conflict is defined as an incompatibility of goals or values between two or more parties in a relationship, combined with attempts to control each other and antagonistic feelings toward each other. It is also important to help students to know how their emotional intelligence works to help or hinder their conflict. The development of emotional intelligence is an intentional, active, and engaging process. The role and importance of Emotional intelligence gets a vital role in conflict management. To achieve the high goals and expectation of education in the 21st century, we should develop Emotional intelligence skills in teacher education programs.

1. Introduction

India is one of the world's largest producers of tropical fruits such as banana, citrus and mango (National Horticulture Board (NHB), 2009). Fruits are excellent source of nutrients such as minerals and vitamins; and also contain carbohydrates in the form of soluble sugars, cellulose and starch (Nahar et al., 1990). Banana is a seasonal and highly perishable fruit which is available all year round. During ripening of banana, the starch components are converted to sucrose, glucose, and fructose and in addition, water in the pulp increases. Banana could then compete in the market, either as banana juice or as mixtures with other juice because of its flavor and aroma (Viquez et al., 1981; Lee et al., 2006). According to India Agricultural Research Data Book (2008), the estimated fruit and vegetable production in India was 150 MT and the total waste generated was 50 MT. The extent of total losses in these commodities is approximately estimated as 20 - 30% of the total production, amounting to a loss of Rs. 30,000 crore per annum. However, due to the higher commercial and nutritional value of the banana, only 15% of the dessert banana is consumed by consumers. This is a great loss for the farmers, which is poor in food sector. So converting the raw material into value added products is a viable solution to avoid this loss.

Banana juice can be consumed as wine by adopting appropriate technology. Banana based wines may be considered as a healthy beverages. There has been research to identify the micro-organisms involved in banana wine production. Micro-organisms associated with the fermentation of grapes have been identified (Davies, 1994). Grape wine is the value added product from fruits and S. cerevisiae is the most important yeast for wine production and responsible for the metabolism of sugar to alcohol and CO_2 (Reed & Peppler, 1973; Fleet, 1993; Pretorius et al., 1999; Pretorius, 2003; Swiegers & Pretorius, 2005). The role of non-Saccharomyces yeasts in wine fermentation is receiving increasingly more attention by wine microbiologists. The quality of wines depends on number of factors such as fruit and yeast strain, sugar level and acid content of juices (Joshi, 1998). The rate of fermentation depends on total soluble solids (TSS), time, temperature, pH and inoculums concentration. Traditional banana juice extraction and its subsequent fermentation to produce beer (tonto) is an important social and economic activity among many tribes in East Africa (Stover & Simmonds, 1987; Davies, 1993). Likimani (1991) reported that tonto is a popular traditional beverage in Burundi, Uganda and Rwanda. Though a number of studies have been carried out on banana fruits and derived various food products, but no comparative research in field of non-saccharomyces fermentation condition for production of wine from banana juices has been reported. Therefore, the present study aims to produce wine by fermentation process of banana fruit (juice) in the presence of S. cerevisiae and Pichia sp.

2. Materials and Methods

Over ripe fruits of Jahaji kola (JK) with large black spots of banana were collected from local market of Silchar of Cachar district of South Assam during the month of March, 2012 (day temperature, 32±2oC and night temperature 26±2oC). Bananas were collected aseptically in sterile polythene bags kept in a carton box and transported to the Microbiology Laboratory of Assam University, Silchar for further analyses.

2.1. Preparation of fruit juice

The banana bunches were washed with distilled water to remove unwanted materials followed by washing the banana fingers with 70% alcohol for surface sterilization. Banana fruits were hand peeled and the edible portion (pulp) was blended with hand blender (Model: HBPC, Morphey Richards, India). Half the pulp was then mixed with 0.5% (w/v) pectinase enzyme and remaining half without enzyme as a control to obtain the juice. After 24 h the juice was strained through a double folded cheese cloth and the juice obtained was stored at -15oC for further analysis.

2.2 Preparation of Starter Culture

Starter culture was prepared by inoculating non-Saccharomyces yeast Pichia sp. (CJ) and Saccharomyces cerevisae (S-170) in 200 mL YPD broth and incubated at 27 ± 2oC for 18 h at 180 rpm on an orbital shaking incubator (655D, Fisher Scientific). Yeast cells were harvested by centrifuging a centrifuge (5804R, Eppendrof) run at 6000 rpm for 10 min. The harvested cells were washed twice by 0.85% sterile saline water and resuspended in 250 mL banana juice. The counts in the inoculum were in the range of 107-108 cells mL.-1

2.3 Physicochemical analysis of banana juice
The banana juice was analysed for pH using a digital pH meter (Systronic-335, India). Moisture content was determined by vacuum oven method (AOAC, 1990). Total carbohydrates, total protein, reducing sugar, ascorbic acid, titratable acidity (citric acid) and total polyphenols were analysed according to Sadashivam and Manickam (2008). Total soluble solids concentration (oBrix) was measured using hand refractometer (Erma, Japan).

2.4 Fermentation of Banana Juice
The reducing sugar of banana juice was adjusted 30% by adding distilled water to attain samples of final TSS ranging 22oBrix and pH 4.6. The banana juice (1L) was added to each of two fermented flask. Each flask was inoculated with 10% (v/v) 24 h old yeast inoculums under aseptic condition. The flasks were tightly closed with robber stoppers fitted with fermentation locks containing an aqueous solution of 200 ppm potassium metabisulaphite to inhibit the growth of undesirable yeast. The mixture was incubated at room temperature (28±1° C) for 21 days in dark.

After 21 days, the fermented juice was filtered and transferred to sterile conical flask with tightly closed cotton plug and aluminium foil and stored until gas evolution stopped. The fermented juice was then pasteurized using a serological water bath (SBS-4, India) at 72±2° C for 15 min and stored in a refrigerator at 4±2° C.

2.5. Physico-chemical analysis of banana wine
The banana juice was analysed for pH, TSS, ascorbic acid, titratable acidity, total sugar, reducing sugar and total polyphenols by methods as mentioned above. Percentage of alcohol production was analysed by the method described by Caputi et al., (1968).

2.6. HPLC analysis of sugars of banana juice and banana wine
HPLC analysis was carried out on a Shimadzu LC-10A instrument using an aminopropyl column (3.9×300mm, 10μm) from Waters Spherisorb (WAT832313). An isocratic elution for 30 min using acetonitrile: water (75:25) was applied at a flow rate of 1mL/min. 20 μL of samples were injected into the column and the absorbance of separated compounds were measured using a refractive index detector and quantified using the standards as fructose, sucrose, glucose and maltose.

2.7. Statistical Analysis
All the experiments were carried out in duplicates except HPLC analysis. Means and standard deviations of appropriate data were obtained as described by Steel and Torrie (1960). Significance values for all the analysis were carried out and reported.

3. Results and Discussion
3.1 Physico-chemical analysis of banana juice and fermented banana wine
The physicochemical analysis of banana juice and banana wine is shown in Table 1 and 2. The result revels that the banana juice possessed little higher acidity and slightly lower pH. After fermentation, the pH was highest in the juices which were not treated with enzymes. The lowest pH was observed in wine prepared from JK-P (S-170) juice. A result confirms with the data reported for kinnow juice fermentation (Singh et al., 1998). Although there was slight, but not significant difference ($p > 0.05$) in titratable acidity. The titratable acidity was highest in the enzyme treated wines of the two samples at 10% in JK-P (S-170) and 10.4% in JK-P (CJ). The lowest titratable acidity was measured in control wine samples at 9% JK-C (S-170) and 9.6% JK-C (CJ).

The highest volatile acidity was detected in the control wine samples whereas lowest levels were found in JK-P (CJ) at 0.03% (Amerine & Ough, 1980).The total soluble solids of the banana juice ranging between 22oBrix and 27oBrix (Table 1) was lowered to 6 - 8.3oBrix in wines. The lowest TSS was observed in wine from JK-P (S-170). Total sugars reduction being highest in JK-C (CJ) and JK-P (CJ) wines, followed by JK-C (S-170) and little change in JK-P (S-170) sample. Reductions were related to the utilization of sugars by yeast. Highest residual sugars were found in control wine samples. The lowest reducing sugar is found in JK-P (CJ). Such accumulations were observed in wine fermentation by Amit et al., (2010).

Alcohol percentage is one of the parameters based upon which a wine is characterized into various categories. Table wine usually contains 11-14% (w/w) as low as 7% (w/w) (Joshi, 1998; Pickering, 2000). Thus, banana wine can be considered as a good quality table wine. Higher alcohol was obtained from the wine prepared from control and enzyme treated banana juice with CJ (non-saccharomyces yeast) as compared to the S-170 (Saccharomyces cerevisiae). Sugars were used for alcohol and organic acid production. The results are in line with the results reported by Jackson and Badrie (2002) who showed that commercial enzyme enhanced banana pulp digestion and improved the wine clarity. The results were similar to the strong banana wine with an alcohol percentage of 11-15% produced from undiluted banana juices (Davies, 1993). Alcohol percentage in wine is influences by the type of yeast, method of wine preparation and initial TSS before fermentation (Joshi et al., 1991).

Sensory scores analyzed by QDA method showed that JK-P with S-170 had the highest overall acceptability (8.5) among the panelists.

3.2 HPLC analysis of banana wine
HPLC analysis of monosaccharide and disaccharides was carried out for four wines as listed in Table 3. The sucrose, fructose and maltose (Table 3 and Fig. 1) were determined as sugar components in banana juice and wine.

Total amount of sugars were 96.8 mg/mL and 51.95 mg/mL in juice and wine, respectively. The main carbohydrates in banana fruit are the three single sugars sucrose, fructose and glucose. Together they present about 80% of the TSS of banana juice and the ratio was about 2:1:1 fructose was present in the largest amount for banana juice 90.9 mg/mL (control) 59.8 mg/mL enzyme treated banana juice and wine 1.3 mg/mL JK-C (S-170) and 0.9 mg/mL for JK-P(S-170), 1.1 mg/mL JK-C(CJ) and 1.9 mg/mL JK-P(CJ), respectively. There was a decrease of fructose sugar in all the wines (Fig. 2, 3, 4 and 5). However, presence of maltose and mellibiose concentration was observed. Wine from Pichia sp. JK-C (CJ) indicated the complete utilization of fructose sugars.

4. Conclusion
Wine produced from banana juice can be potential source for table wine with good percentage of

alcohol and suitable physicochemical attributes. The wine prepared from ripe banana juice using Saccharomyces cerevisiae had 5.1% (v/v) alcohol, 1.76 (mg/g) protein and 1.5 mg/100 mL vitamin C whereas Pichia sp. had 10-11% (v/v) alcohol, 0.30 (mg/g) protein and 1 mg/100 mL vitamin C with acceptable flavor, taste and clarity. Hence, in the study, Pichia sp. indicated better yield in term of alcohol percentage and compared to Saccharomyces cerevisiae. From HPLC data quantitatively the major sugar was found as fructose, sucrose and maltose in the samples.

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Table.1 Physicochemical parameters of JK banana juices

Parameters	JK juice (control)	JK juice (Pectinase enzyme treated 0.5%)
pH	4.62 ± 0.14	4.81 ± 0.64
Moisture (%)	81 ± 0.00	80 ± 0.01
Titratable acidity (% citric acid)	3 ± 0.73	4.8 ± 0.59
Total Carbohydrate (mg/ml)	145.00 ± 0.29	145.62 ± 0.95
Reducing sugar (mg/ml)	23.45 ± 0.82	31.87 ± 0.75
Non reducing sugars (mg/ml)	121.55 ± 0.54	113.75 ± 0.39
Protein (mg/ml)	1.09± 0.64	1.35 ± 0.28
Total polyphenol (μg/ml)	2.92 ± 0.82	3.52 ± 0.19
Amino acid (μg/ml)	10.26 ± 0.33	11.51 ± 0.47
oBrix	22oB	26.8oB

Table 2. Physicochemical parameters of banana wine

Attributes	*JK-C (S-170)	*JK-P (S-170)	*JK-C (CJ)	*JK-P (CJ)
pH	4.21±0.36	3.98±0.06	4.03±0.08	4.47±0.01
Titratable acidity (v/v, %)	9±0.08	10±0.05	9.6±0.02	10.4±0.02
Volatile acidity (v/v %)	0.54±0.12	0.61±0.03	0.06±0.08	0.03±0.06
Total Carbohydrate (mg/ml)	18.12 ±0.09	18.06±0.02	18.43±0.01	15.87±0.05
Protein (mg/ml)	0.30±0.01	1.76±0.04	1.11±0.07	2.53±0.52
Reducing Sugar (mg/ml)	3.31±0.17	1.73±0.23	3.78±0.08	1.68±0.25
Amino acid (μg/ml)	5.63±0.02	5.35±0.01	1.22±0.09	2.15±0.02
Alcohol (% v/v)	5.57±0.01	3.57±0.13	10.66±0.32	11.51±0.05
Ascorbic acid (mg/g)	1.5±0.07	1.4±0.04	1±0.00	1.1±0.09
Total polyphenols (μg/ml)	70.02±0.92	86.47±0.56	70.52±0.62	87.59±0.03
oBrix	8oBrix	6oBrix	8.3oBrix	7.6oBrix

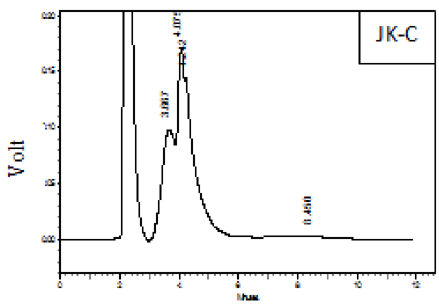
*Jahaji kola (JK), *Non Saccharomyces (CJ) fermented banana juice (JK-C) and enzyme treated banana juice,*Saccharomyces cerevisiae (S-170) fermented banana juice (JK-C) and enzyme treated banana juice (JK-P)

Table 3. HPLC sugar analysis of the various combinations of wine

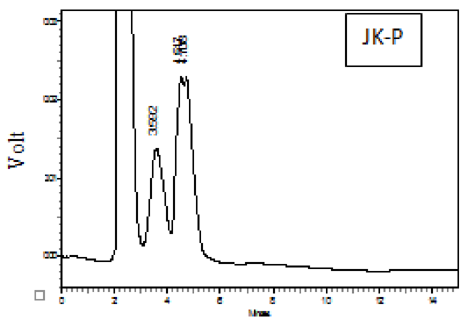
RT (min)	Compound	0 day	Wine samples			
			JK-C (S-170)	JK-P (S-170)	JK-C (CJ)	JK-P (CJ)
4.428	Glucose	P	–	–	P decreases	–
3.626	Fructose	P	P decreases	P decreases	–	P decreases
4.204	Sucrose	P	–	–	–	–
4.848	Galactose	A	–	–	–	–
5.459	Maltose	P	P decreases	P decreases	P decreases	–
5.441	Cellibiose	A	–	–	–	–
6.051	Mellibiose	P	–	–	–	–
6.10	Sorbitol	A	P decreases	P decreases	–	–

Fig. 2 HPLC profile of JK-C and JK-P with CJ; (a) control and (b) pectinase treated

Fig. 3 HPLC profile of JK-C and JK-P with S-170 (a) control and (b) pectinase treated

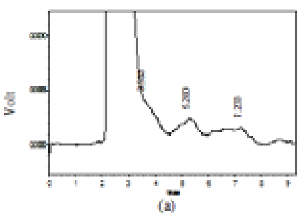


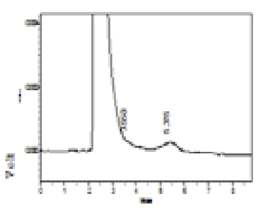
(a)

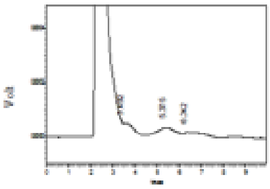


(b)

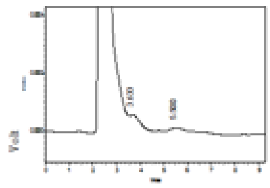
Fig .1 HPLC profiles of 0 day banana juice; (a) control and (b) pectinase treated







(b)



(b)

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