International Journal of Food and Fermentation Technology v. 1, n. 1, June 2011, pp. 133-136 **Short Communication**

Preparation and evaluation of red wine from Punjab purple(Syn.H.516) variety of grapes

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Abstract: Punjab purple, a red grape variety was evaluated for red wine production over a period of three years. A consistent ethanol production of about 10-11% (v/v) with a mean recovery of 62.4 % was observed. The red wine produced was found to be of standard quality (mean score of 63.5 out of 80) on the basis of sensory evaluation and had phenolics content of 2496 mg/L which endows it with a high antioxidant potential.

Keywords. Red wine, Ethanol, Fermentation, Sensory, Phenolics.

Introduction

Wine, a fermented undistilled alcoholic beverage is produced by anaerobic fermentation of grape sugars to ethanol by *the* wine yeast (Amerine *et al*, 1980; Joshi *et al*, 2011) and have a number of secondary metabolites including polyphenols (anthocyanins, flavonoids etc.) that are key determinants of wine quality and endow it with antioxidant potential (Chen *et al*, 2009). Traditionally, red wine is produced from grape varieties that have black or red colour and the fermentation is carried out on the skin using standard wine yeast (Amerine *et al*, 1980). India is the 12th largest grape producing country in the world and tops in grape productivity with a yield of 26.2 tonnes/ha. But uses only about 2% of the produce for wine production compared to 82% in the world as a whole (Anonymous, 2010) Henceforth, per capita consumption of wine in India is just 7 ml compared to 60 and 50 litres in France and Italy, respectively (Patil, 2008) which is attributed to several factors such as lack of suitable varieties of of grape, suitable wine producing yeasts etc.. The Indian wine industry is still in its infancy and restricted to Maharashtra and Himachal Pradesh but is expected to grow by 25-30% between 2009 and 2012 (Patil, 2008; Kocher *et al*, 2009; Anonymous, 2009). This requires availability of suitable varieties of grapes .

The selection of suitable grape varieties having the potential to make unique, flavorful wines of very high quality is a continuous and routine type of work in every wine producing country. This is of particular concern in India where in spite of high grape productivity, suitable wine producing varieties are lacking. A considerable research work on optimization of physiochemical parameters such as temperature, pH, inoculum size, supplementation of nitrogen and phosphorous has been carried out (Erten *et al*, 2006; Asli, 2010). In the present study, a local variety of grapes, Punjab purple(Syn.H.516) has been evaluated for production of red wine and characterized for its chemical and sensory characteristics.

Materials and methods

Extraction of juice and preparation of must: Ten kg of

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MS Received on : 22nd March 2011
Accepted on : 10th May 2011

Punjab Purple grapes destemmed manually were washed with KMS solution (0.01% w/v). The grape berries were then crushed in a juicer and the juice was extracted. This juice was supplemented with KMS @ 0.01% and ammonium hydrogen phosphate @ 0.025% (w/v). The TSS of the juice was measured as a Brix (B) with a hydrometer.

Alcoholic fermentation

Yeast inoculum: The yeast, *S. cerevisiae* strain 35 was used @ 5% (v/v), which was prepared in 500 ml of grape juice, 24h before preparation of juice as a standard practice. The inoculated juice was incubated at a temperature of 28-30°C for 24 h at 100 rpm.

Fermentation: The fermentation of grape juice was carried out in three sets of experiments during 2008 to 2010 having different initial Brix values. The yeast inoculum prepared above was added to the juice in the 10L fermentation flask and incubated at 26±2°C. The fermentation was complete in 3 days when bubbling ceased and the sediment settled at the bottom of the fermentation flask with final Brix falling to 0°B.

Postfermentation treatment: The wine was kept undisturbed in a refrigerator for two days and decanted. The same was kept further at 15°C to settle the dead yeast and other sediments. This process of racking was repeated 3-4 times involving a settling time of at least two weeks in between or till there was no sediment. Finally, the clarified wine was bottled in 200 ml capacity bottles. The capped bottles were then, pasteurized at 65°C for 10 min. and stored at room temperature. The bottles were cooled in a refrigerator before sensory evaluation.

Analyses: The ethanol concentration in the fermenting must was analysed by the method of Caputi and Wright (1969). Besides, wines were also analyzed for titrable acidity (Amerine and Ough, 1980), pH (digital pH meter) and total phenolics (Slinkard and Singleton, 1977). The sensory analysis was carried out by a panel of 7 judges on a 80 point modified hedonic scale (Superior, 68- 80; Standard,52-68; Below standard, 36-52 and Unacceptable/ Spoiled, 4-36) over the 3 years.

Statistical analysis: All the experimental trials were conducted in triplicate sets. The data of alcoholic fermentation and sensory

Table 1. Alcoholic fermentation (year wise) of Punjab Purple for wine production

Year	Rate of Brix (ºB) utilization per day	Rate of Ethanol production (% v/v) per day	Fermentation efficiency (%)	Recovery (%, v/v)
2008	5.52 ± 0.41	3.29 ± 0.24	90.5	62.5
2009	5.76 ± 0.36	3.55 ± 0.32	100	62.7
2010	7.1 ± 0.48	3.68 ± 0.18	80.9	62.0
Mean	6.1 ± 0.56	3.51 ± 0.26	90.4	62.4
$CD_{5\%}$	NS	NS	-	-

Design = RBD; Values are Mean±S.E., NS = Non-significant.

Table 2. Physico–chemical Characteristics of the red wine prepared from Punjab Purple grapes

Year	Physico–chemical Characteristics				
	Ethanol (v/v)	Sensory score (80)	Titrable acidity (% w/v)	pH	Total phenolics (mg/L)
2008	10.6±0.05	60.7±2.44	0.56±0.02	3.58±0.08	2358±23.8
2009	9.5±0.21	68.3±2.03	0.64±0.05	4.2±0.03	2567.3±28.9
2010	11.0±0.45	60.7±2.90	0.59±0.02	3.69±0.06	2515.7±26.4
Mean	10.5 ± 0.33	63.524 ± 8.90	0.6 ± 0.06	3.5 ± 0.09	2496 ± 22.5

Design = RBD; Values are Mean±S.E.

analysis were analysed statistically by taking means and Standard error or fitting it on a 2 way ANOVA of a computer programme statistical package (Cheema and Sidhu, 2004).

Results and discussion

Alcoholic fermentation: The alcoholic fermentation carried out with *S.cerevisae* strain 25 revealed consumption of sugar (decrease in Brix) with time which was accompanied with an increase in ethanol content (Fig 1). It is a typical trend of ethanolic fermentations (Kocher *et al*, 2009; Soni *et al*, 2009). While the Brix values decreased to zero in 72 h, the ethanol approached its peak values of 10.6, 9.8 and 11.04 (v/v) in the years 2008, 2009 and 2010, respectively in the same time. The Brix as well as ethanol trends showed significant change with time though the values were statistically at bar with each other 3 years tested. Similarly, the rates of brix utilization and ethanol production during the three sets of experiments were statistically non -significant ,suggesting a consistent ethanol production over the years (Table 1). The corresponding fermentation efficiency ranged between 80.9 to 100% with a mean of 90.4 and recovery of wine from 62 to 62.7 with a mean of 62.4%, v/v (Table 1). The fermentation efficiency was found to be indirectly related to initial Brix as high initial value of 21.3 °B during 2010 produced 80.9% while a lower value of 16.5 °B produced 100% fermentation efficiency during the year 2008. An initial Brix of 16-18 and 18-19 °B have been reported as optimum for ethanol fermentation and production of Ohio Vidal Blanc wines, respectively (Gallander, 1983). This might be the reason for a low (80.9%) fermentation efficiency during 2010 (Asli 2010). The The bottled clarified/ racked wine was stored for atleast 3 months and evaluated for chemical and sensory characteristics.

Chemical and sensory analysis: The chemical the result of analysis of the red wine for final ethanol, total acidity and total phenolics (Table 2) show a final ethanol (v/v), total acidity (%, w/v) and total phenolics (mg/L) of 10.52, 0.6 and 2496,

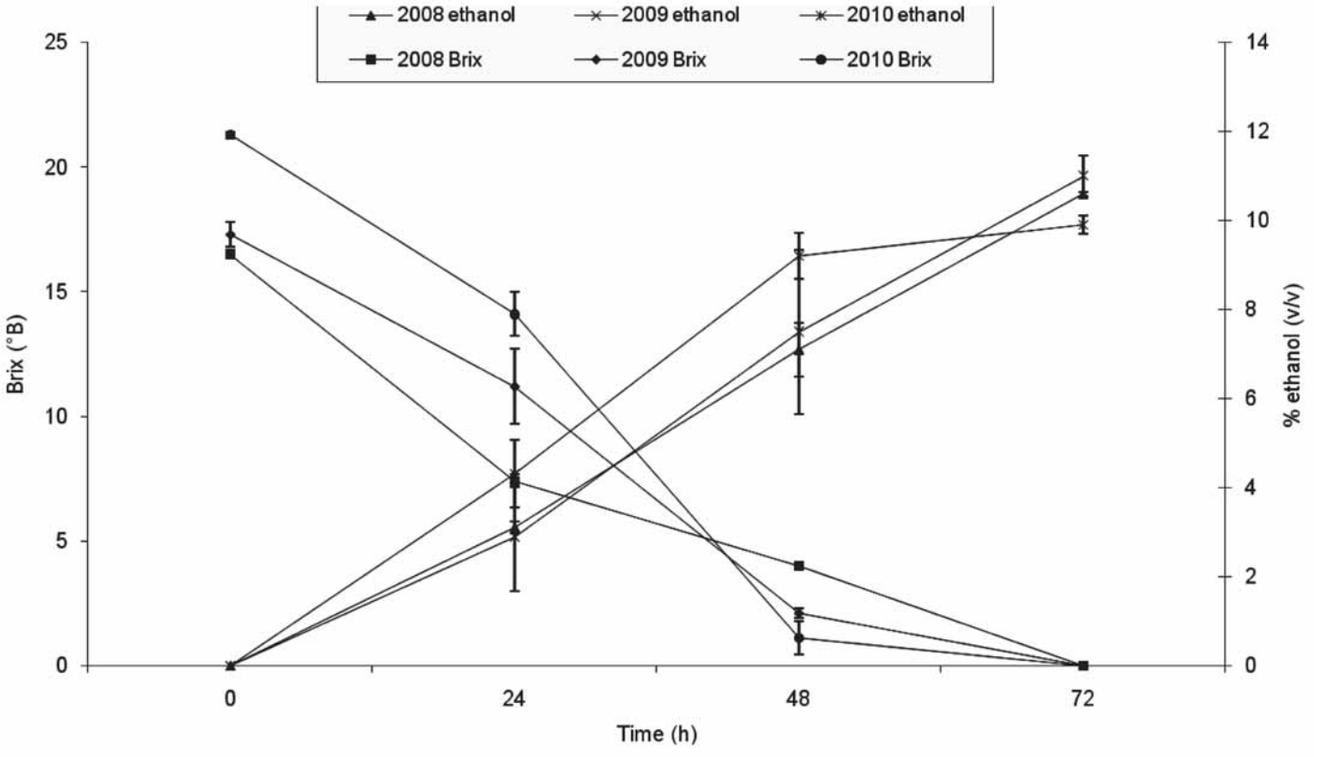

Fig. 1. Effect of fermentation time (h) on Brix(°B) and ethanol production(%v/v) from Punjab Purple grape juice by *S. cerevisae* strain 25. CD $_{5\%}$ Brix (Time = 4.504, Years NS), Ethanol (Time 1.480, Years NS)

respectively. The pH decreased by 0.5 from 4 to 3.5. Earlier, similar decrease in pH has been reported in different wines (Soni *et al*, 2009).The high phenolics were probably due to coloured skin of the grape variety which also adds to the antioxidant potential of the wine. The literature also reveals that red wines have very high phenolics of the range of about 2000 mg/L (Frankel *et al*, 1995; Sanchez-Moreno *et al*, 2003; Chen *et al*, 2009).

The data on sensory analysis by the panel of 7 judges presented in Table 2 revealed that red wine prepared from Punjab Purple grapes was high standard wine with a score range of 60.7 to 68.3. The data also revealed a non- significant variation in sensory scores over the years thus, authenticating the sensory quality of wine prepared. The sensory scores of red wine from Punjab purple was better than white wines prepared earlier by us (Kocher *et al*, 2009).

Conclusion

Based on the results , Punjab purple has been found to produce very good quality red wine which remained consistent during the 3 years of study. Since the red wine also had high phenolic content so has high antioxidant potential.

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