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FERMENTED HEALTH DRINK FROM MULBERRY FRUIT (*MORUS NIGRA SP*)

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ABSTRACT

Mulberry fruits are good source of vital nutrients and antioxidant especially Anthocyanins, which can be utilized for preparation of various value added products. Traditionally, mulberry fruit has been used as a medicinal agent to nourish the skin and blood, benefits kidneys treat weakness, fatigue, anaemia and premature graying of hair. An attempt has been made to develop fermented Health Drink and studied the physico-chemical characteristics of mulberry fruits. The *Morusnigra* fruits were collected and fermented health drink was developed with three variations such as with whole fruits, crushed fruits and crushed mulberry with Resins. Cent per cent incorporation was acceptable in fermented health drink. The variation which was prepared by crushed mulberry fruits obtained highest score for all sensory attributes.The physico-chemical characteristics of product showed that the TSS was 6˚BRIX, titrable acidity was 0.58per cent, alcohol percentage was 6.06per cent and pH was 3.59. The nutrient composition showed that protein was 1.6per cent, fat 0.4per cent, crude fibre 0.7per cent, carbohydrate 125.4per cent, and total ash was 1.07per cent. The analysis of micronutrients showed that, calcium was 77.39mg per cent, phosphorus 24.19mg per cent, vitamin C 19.13mg per cent and iron was 2.97mg per cent. It was found that fermented drink had 2.71mg per cent of Anthocynins. The cost of production fermented health drink was Rs. 12 per 100ml. The product was stored in glass bottles of 100ml capacity at room temperature. The sensory evaluation for stored fermented health drink was done for two, four and six months and the score was high as the storage time increased, which may be due to aging.Thus fermented drink can be recommended as health drink as it is rich in nutrients and also for the anthocyanin content.

INTRODUCTION

Mulberry plant (Morus sp.) is cultivated in different parts of the world largely for its foliage, which is used for feeding silkworms (*Bombyx mori* L.) in the production of silk. But depending on the location, it is also appreciated for its delicious fruits, medicinal properties, as animal feed, and for landscaping. The term 'Morus' comes from the Latin 'mora', meaning delay, probably because of the very slow development of its buds.

Traditionally, mulberry fruit has been used as a medicinal agent to nourish the skin and blood, benefits kidneys treat weakness, fatigue, anaemia and premature greying of hair. It is also used to treat urinary incontinence, tinnitus, dizziness and constipation in the elderly and the anaemic, because the fruits are rich in vital nutrients and antioxidants especially anthocyanin. The fruits usually wasted can be utilized for preparation of various value added products. An attempt has been made to develop fermented Health Drink and studied the physico-chemical characteristics of mulberry fruits.

MATERIAL AND METHODS

The *Morus nigra* fruits were collected from Department of Sericulture, GKVK, Bangalore and Shidlaghatta during August-September, 2011 and March-April, 2012. Hundred per cent mulberry fruit is used as a fresh for the preparation of fermented health drink. Different methods were used for the preparation of fermented health drink such as mulberry fruit in crushed form(MFD), whole mulberry fruit (AFD) and mulberry fruit blended with resins at the ratio of 9:1 (BFD). They were inoculated with 3 to 4per cent of yeast starter culture (Saccharomyces cerveseae).

Developed products were evaluated using nine points hedonic scale by 10 to 15 semi trained panel of judges from the Department of Food Science and Nutrition, Post Harvest Technology and Department of Horticulture, UAS, GKVK, Bangalore.

The best accepted variation of the product was tested for the physico-chemical characteristics like total weight, pH, titrable acidity, TSS and per cent alcohol (Caputi et al., 1968). Macro and micro-nutrients like Moisture, protein, fat, crude fibre, ash and energy (AOAC method), iron (Wong, 1928), vitamin C (Sadasivam and Manickam, 1997), calcium (Hawk, 1957) and phosphorus, were analyzed using AOAC method. Cost of the raw ingredients at the time of purchase, material cost and 20per cent as overhead charges were calculated to get the production cost. The drink was stored in glass bottles of 100ml capacity at room temperature. Sensory evaluation for stored fermented health drink was done for two, four and six months.

RESULTS AND DISCUSSION

In fermented health drink, the variation which was prepared by crushed mulberry fruits (MFD) was scored highest for all sensory attributes (Table 1).The observations namely, TSS, titrable acidity, per cent alcohol and pH were recorded for squash and fermented health drink, which are presented in the Table 2. It is evident from the results that the TSS recorded in fermented health drink was 6˚BRIX, the titrable acidity was 0.58per cent, alcohol percentage was 6.06per cent and pH was 3.59. The increase in alcohol content was due to the complete conversion of sugars to alcohol. It was treated as fermented health drink with 6 per cent alcohol. Due to the low pH level, and level of alcohol percent did not riseup to the mark (7-14per cent) to convert it to wine with commercial Saccharomyces cerevisiae. Due to fermentation, micronutrients like B-complex vitamins increased, alcohol percent in lower amount helps in stimulating the nerves, and there was development of flavor and aroma.

Table 1: Mean sensory scores of fermented health drink

Treatment combination	Mean sensory scores							
	Appearance	Colour	Aroma/ Bouquet	Acidity	Sweetness	Body	Astringency	Overall acceptability
MFD	7.4	7.4	7.7	7.5	7.4	7.3	7.3	7.5
AFD	7.4	7.0	6.6	6.5	6.4	6.6	6.7	6.6
BFD	7.1	6.9	5.7	5.7	5.1	5.6	5.4	5.4
F- value	NS	NS	*	*	*	*	*	*
SEm±	0.060	0.080	0.056	0.056	0.079	0.078	0.082	0.058
CD at 5%	-	-	0.092	0.089	0.181	0.175	0.194	0.098

MFD – Mulberry (crushed)

AFD – Whole mulberry

BFD – Blended (Mulberry-90%; Resins-10%)

*Significant at 5% level, NS: Non-significant

No. of panel members: 10

Table 2: Physico-chemical properties of value added products (squash and Fermented health drink)

Characteristics	Fermented health drink (FHD)
Total weight	150ml
Total soluble solids (TSS)	6˚BRIX
Titrable acidity	0.58%
Per cent alcohol	6.06%
pH	3.59

It is evident from Table 3 that nutrient composition of Fermented health drink was found to have high carbohydrates and energy because of addition of sugar to the product and was fair source of micro nutrients like, iron, calcium and phosphorus.

Table 3: Nutrient composition (100g) of developed products using fresh mulberry fruits (Squash and Fermented health drink)

Parameters	Fermented health drink(FHD)
Protein (g)	1.6
Fat (g)	0.4
Fiber (g)	0.7
Total ash (g)	1.07
Carbohydrates (g)	125.4*
Energy (k.cal)	529*
Iron (mg)	2.97
Vitamin C (mg)	19.13
Calcium (mg)	77.39
Phosphorus (mg)	24.19
Anthocyanin (mg)	2.71

*Computed value

Cost of production for fermented health drink was Rs. 12/- per 100ml (Table 4). It is not usual practice of selling of fruits in Karnataka. So the information about price of the mulberry fruit has been taken from North India i.e., Himachal Pradesh. The MorusLaevigata and Morusrubra are sold in commercial markets in Himachal Pradesh.

Table 4: Production cost of Fermented health drink/100ml

Ingredients	Amount (Rs.)/kg or Litre	Quantity (g/ml)	Price (Rs/-)
Mulberry fruits Sugar Commercial Yeast (Saccharomyces cerveseae)	200 32 70	100g 120g 5ml	20 3.84 0.21
Total	-	250ml	24.05
Overhead charges (20%of the cost)	-	-	4.81
Cost of the product	-	250ml	28.86
		100ml	11.54

(Round off to Rs. 12.00)

The sensory characteristics of fermented health drink were done for two, four and six months and the score was higher as the storage time increased (Table 5). It may be due to aging.

Table 5: Mean sensory scores during shelf life study of fermented health drink

Treatment combination	Mean sensory scores							
	Appearance	Colour	Aroma/Bouquet	Acidity	Sweetness	Body	Astringency	Overall acceptability
Initial	7.4	7.4	7.7	7.5	7.4	7.3	7.3	7.5
2 months	7.6	7.5	7.6	7.6	7.5	7.5	7.3	7.5
4 months	7.6	7.8	7.5	7.6	7.7	7.7	7.6	7.8
6 monhts	7.8	8.0	7.7	7.8	8.4	7.8	7.9	8.4
F- value	*	*	NS	NS	*	NS	*	*
SEM±	0.051	0.062	0.049	0.048	0.083	0.050	0.053	0.044
CD at 5%	0.075	0.109	-	-	0.198	-	0.080	0.055

*Significant at 5% level, NS: Non-significant

No. of panel members: 10

CONCLUSION

Mulberry fruit, rich in anthocyanins, could be considered as a potential source for production of a fermented healthdrink are is not available in the Indian market. Hence, there is a potential for commercialization. At present, cultivation of mulberry plants is meant for silkworm rearing only, and fruit production is not aimed in Karnataka. Cultivation of mulberry for silk worm rearing as well as for fruits could be an additional source of income of farmers.

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