International Standard Serial Number (ISSN): 2249-6807

International Journal of Institutional Pharmacy and Life Sciences 4(3): May-June 2014

INTERNATIONAL JOURNAL OF INSTITUTIONAL PHARMACY AND LIFE SCIENCES

Life Sciences **Research Article……!!!**

Received: 05-01-2013; Revised; Accepted: 02-05-2014

DEVELOPMENT OF VALUE ADDED BAKERY PRODUCTS FROM MULBERRY FRUITS (*MORUS NIGRA SP*)

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Keywords:

Mulberry fruits, bakery products, sensory attributes

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ABSTRACT

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 value added bakery products from mulberry fruits. The *Morus nigra* fruits were collected and bakery products like bread and biscuits were developed with three variations each. The products were evaluated for acceptance by semi-trained panel of judges and the results were statistically tested to see the significant difference between the levels. Bread with 15per cent of dried mulberry fruit and four per cent of fruit powder obtained the high scores, compared to control. In biscuits, the variation with 15per cent of dry mulberry fruits and two per cent of fruit powder obtained high scores. Bread has higher amount of protein, total ash, and micronutrients like calcium phosphorus and iron, than biscuits. The cost of production bread and biscuit was 16 per 100g and Rs. 25 per 100g respectively. The bakery products like bread and biscuits which were stored in HDPE bags at room temperature were evaluated for sensory attributes. The score reduced as the days increased.

INTRODUCTION

At present, cultivation of mulberry plants is for silkworm rearing only; the fruits are generally wasted and fruit production is not aimed in Karnataka. There is a great scope for the production of fruits and fruit based products. Therefore, the present study has been taken up to develop commercially viable value added products incorporating fresh as well as dry fruits. The fruits usually wasted can be utilized for preparation of various value added products, which are of commercial importance from the industrial as well as health point of view.

Mulberry plant (Morus sp.) is cultivated in different parts of the world largely for its foliage, which is used for feeding silkworms (Bombbyxmori 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. So an attempt has been made to develop value added bakery products.

MATERIALS AND METHOD

The Morusnigra fruits were collected from Department of Sericulture, GKVK, Bangalore and Shidlaghatta mulberry fruit based value added product was carried out by incorporating different levels of mulberry fruits and dried powder.

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 incorporation of dry mulberry fruits in bakery products was 10 to 20per cent depending upon suitability and tested for acceptance on nine point hedonic scaleby semi trained panel of judges.

Two bakery products (bread and biscuits) were tried out using both dry fruit as well as the powder form as a colouring agent. Products were tried out using dry mulberry fruits at 10, 15 and 20per cent levels. Mulberry fruit powder at 2per cent and 4per cent was added to biscuits and bread respectively as a colouring agent and also to enhance anthocyanin content.

The best accepted variation of the product was tested for 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.

To study the shelf life of the bakery products, the best accepted products were packed in High Density Poly ethylene (HDPE) covers, heat sealed and stored at ambient conditions (30±1˚C). Samples were drawn (every 2nd day for bread and every 4nd day for cookies) and were tested for sensory attributes. HDPE covers were selected because of high impact strength and good seal-ability character.

RESULTS AND DISCUSSION

Two types of bakery products were developed and standardized after incorporating mulberry fruit. Dry mulberry fruits at 10, 15 and 20per cent levels and mulberry fruit powder at 2per cent and 4per cent was added to biscuits and bread respectively as a colouring agent and also to enhance anthocyanin content.

The acceptability scores were based on nine point hedonic scale. Bread with 15per cent of dried mulberry fruit with 4per cent of fruit powder (BMF) was scored high. In biscuits, the variation with 15per cent of dry mulberry fruits with two per cent of fruit powder (CTP) obtained high scores (Table 1 and 2).

Table 1 : Mean sensory scores of bread

Treatment combination	Mean sensory scores					
	Appearance	Texture	Colour	Aroma	Taste	Overall acceptability
BCT	8.4	8.2	8.5	7.8	7.8	8.5
BMT	7.8	7.5	7.4	7.0	6.9	7.3
BMF	7.1	7.3	7.0	7.7	7.6	7.8
BMS	6.9	6.9	6.5	6.7	6.8	6.7
F- value	*	NS	*	*	NS	*
SEm±	0.070	0.107	0.077	0.088	0.106	0.070
CD at 5%	0.142	-	0.170	0.221	-	0.142

BCT - Control
BMT – Dry mulberry fruit 10% + Mulberry powder 4%
BMF - Dry mulberry fruit 15% + Mulberry powder 4%
BMS - Whole mulberry fruit 20% + Mulberry powder 4%
*Significant at 5% level, NS: Non-significant
No. of panel members: 10

Table 2 : Mean sensory scores of biscuits

Treatment combination	Mean sensory scores					
	Appearance	Texture	Colour	Aroma	Taste	Overall acceptability
CCT	8.3	8.1	8.0	7.8	7.8	8.0
COP	8.2	7.8	8.0	8.2	7.9	7.9
CTP	7.8	8.0	8.2	7.9	8.0	8.0
CMP	7.0	7.1	6.9	6.6	6.6	7.0
F- value	*	NS	*	*	*	*
SEm±	0.080	0.077	0.068	0.089	0.084	0.066
CD at 5%	0.204	-	0.146	0.252	0.221	0.136

CCT – Control
COP – Whole mulberry fruit 10% + Mulberry powder 2%
CTP - Whole mulberry fruit 15% + Mulberry powder 2%
CMP - Whole mulberry fruit 20% + Mulberry powder 2%
*Significant at 5% level, NS: Non-significant
No. of panel members: 11

It is evident from Table 3 that nutrient composition of biscuit was found to have high fat and energy than bread. This is because of adding more fat during preparation. Bread has higher amount of protein, total ash, and micronutrients like iron, calcium and phosphorus than biscuits. This is because of addition of yeast, higher amount of dry mulberry powder and addition of milk powder at the time of preparation.

Table 3 : Nutrient composition (100g) of value added products (bread and biscuits) prepared using dry mulberry fruits and powder

Parameters	Bread	Biscuits
Moisture (%)	32.04	1.11
Fat (g)	6.6	33.6
Protein (g)	15.7	12
Fiber (g)	1.03	0.98
Total ash (g)	0.95	0.74
Carbohydrates (g)	43.7*	51.8*
Energy (Kcal)	297*	558*
Iron (mg)	9.13	8.78
Vitamin C (mg)	5.05	2.49
Calcium (mg)	214	71.97
Phosphorus (mg)	130	49.94
Anthocyanin (mg)	2.24	3.69

*Computed value

The cost of production for bread and biscuit were Rs. 16/- per 100g and Rs. 25/- per 100g respectively (Table 4and 5). The cost of the biscuits was higher because of usage of more fat and sugar. 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 *Morus laevigata* and *Morus rubra* are sold in commercial markets in Himachal Pradesh.

Table 4 : Production cost of Bread/100g

Ingredients	Amount (Rs.)/kg or Litre	Quantity (g/ml)	Price (Rs/-)
Refined wheat flour (maida)	22	100g	2.2
Fat	120	10g	1.2
Yeast	70	1g	0.07
Sugar	32	20g	2.63
Milk powder	175	15g	0.03
Salt	14	1-2g	19.38
Mulberry fruit (dry)	200	19g	
Total	-	200	26.16
Overhead charges (20% of the cost)	-	-	5.23
Cost of the product	-	200	31.39
		100	15.69

(Round off to Rs. 16.00)

Table 5 : Production cost of Biscuits/100g

Ingredients	Amount Cost/kg	Quantity (g)	Price (Rs/-)
Refined wheat flour(maida)	22	120	2.64
Fat	110	80	8.8
Sugar	32	50	1.6
Mulberry fruit	250	17	17.34
Vanilla essence	210	2-3 drops	0.5
Total	-	150	30.88
Overhead charges (20% of the cost)	-	-	6.17
Cost of the product	-	150	37.05
		100	24.7

(Round off to Rs. 25.00)

The sensory characteristics of bread was observed for six days and evaluation was done at 2 days interval. The score reduced as the days increased. The bread was slightly harder on fourth day and it became stale and dry on sixth day because of loss of moisture (Table 6). The biscuits were kept for 18 days and were observed with 4 days interval. On 10^{th} day the texture was soft, but there was no change in the taste or other attributes. On 14^{th} day there was slight off flavor and slightly rancid smell was observed. This may be because of high fat content hence the product was discarded. So the results of sensory evaluation showed the decline in all the sensory attributes (Table 7) as the days increased.

Table 6 : Mean sensory scores during shelf life study of bread

Duration (days)	Appearance	Texture	Colour	Aroma	Taste	Overall acceptability
Initial	7.1	7.3	7.0	7.7	7.6	7.8
2	7.1	7.1	7.0	7.6	7.4	7.8
4	6.7	6.3	7.0	7.3	6.9	7.4
6	6.1	5.7	6.9	6.9	6.0	6.6
F- value	*	*	NS	NS	*	*
SEm±	0.068	0.096	0.095	0.081	0.074	0.062
CD at 5%	0.133	0.264	-	-	0.156	0.111

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

No. of panel members: 10

Table 7 : Mean sensory scores during shelf life study of biscuits

Duration (days)	Appearance	Texture	Colour	Aroma	Taste	Overall acceptability
Initial	7.8	8.1	8.2	7.5	7.5	8.0
5	7.8	8.2	8.1	7.3	7.4	8.0
10	7.5	7.9	7.6	7.4	6.9	7.5
14	6.5	7.1	7.2	7.2	5.8	6.6
F- value	*	*	*	NS	*	*
SEm±	0.075	0.042	0.063	0.089	0.084	0.049
CD at 5%	0.160	0.050	0.115	-	0.202	0.070

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

No. of panel members: 10

CONCLUSION

In Indian diets, anthocyanin component is generally low, and hence, such herbal supplements could be an important source. Mulberry fruit, rich in anthocyanins, could be considered as a potential source for production of a natural red food colourant. The value added products prepared by mulberry fruit are not available in the Indian market and hence, there is a potential for commercialisation. 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.

REFERENCES

1. AOAC- Association of Official Analytical Chemists., 1980, Official Methods of Analysis, Horwits, W. (Ed.), thirteenth ed. AOAC, Washington, DC.
2. HAWK., OSER. AND SUMMERSON., 1957, Practical physiological chemistry, 13thEdn., p. 664.
3. SADASIVAM, S. AND MANICKAM, A., 1997, Biochemical methods. New age international publishers, p.p:184, 193.
4. WONG, S. Y., 1928, Colorimetric determination of iron and hemoglobin in blood.ii.J. Biol. Chem. 77*:* 409-412.