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RESEARCH ARTICLE

"UTILIZATION OF DRIED MORUS ALBA LEAVES FOR VALUE ADDED PRODUCT"

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Abstract

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Key words: Mulberry, phytochemicals, cancer β -carotene and osteoporotic patients.

*Corresponding Author Shikha Singh. White Mulberry (Morus alba) belongs to the family Moraceae. Its leaves contain various nutrients (\beta-carotene, ascorbic acid, calcium and dietary fibre) as well as phytochemicals which have various health benefits. The aim of the study was to develop and standardize dehydrated mulberry leaves powder based tomato soup and to assess its organoleptic as well as nutritional quality of product. Mulberry leaves were weighed, washed with water and then dried by Hot air oven for the development of value added products namely *Tomato soup*. Along with control (T_0) , four variations T_1 , T_2 . T_3 and T_4 were prepared which contains mulberry leaves at 0.8%, 1.0%. 1.2%, 1.4% respectively. The sensory attributes of the product was analysed organoleptically by a mixed panel of trained and Semi-trained judges by using 9 point hedonic rating score card. After scoring the average score were calculated for each product. Nutritive value of most acceptable tomato soup prepared by using mulberry leaves was calculated. Appropriate statistical methods were used for data analysis. Among all the treatments average sensory score significantly (P < 0.05) high in T₃, which contains 1.2% of dried mulberry leaves. It can be concluded that fresh mulberry leaves were dried by hot air oven drying method provides a concentrated form of nutrients. Addition of mulberry leaves upsurge the nutrient content of product.

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Introduction:-

Green leafy vegetables are very popular and used for food in many countries of the world, being a rich source of βcarotene, ascorbic acid, minerals and dietary fibre, they have become a part of daily diet. The mulberry, a perennial woody plant having fast growth and short proliferation period (**Pan et.al., 2008**) belongs to family Moraceae and genus Morus (**Yang et.al., 2010**). In general, 10–16 species of genus Morus are found in subtropical, warm and temperate regions of Asia, Africa and North America (**Pérez-Gregorio et.al., 2011**). Some of these are preferred due to foliage yield, delicious fruit, while few have ornamental importance and others are used due to their strong environmental adaptability. Commonly, three species of Morus, Morus alba, Morus nigra and Morus rubra, are grown (**Ercisli and Orhan, 2008**) in colder regions of Pakistan e.g., Azad Kashmir, Chitral and Quetta (**Memon et.al., 2010**). It varies from white to pink; it is sweet but insipid, unlike the more intense flavour of the Red Mulberry and Black Mulberry. White mulberry is also called as *Chinese white mulberry, common mulberry, Russian mulberry, silkworm mulberry, chi sang, chin sang, moral blanco*. Roots, bark and leaves of Morus alba L. are used for various health benefits and ailments in Chinese traditional medicines (**Chang et.al., 2011**). The antioxidant activity of these parts of M. alba in different model systems is also documented (**Charunuch et.al., 2007**). Due to the presence of precious phytochemicals (coumarins, flavonoids, phenols), the leaves of Morus alba L. possess pharmacological importance and have been reported to reduce blood pressure and cholesterol level (**Zhang et.al.,** 2009). Morus nigra L. is a wildly growing rustic plant, also grown in gardens and is used as sericulture. It is also used as part of Chinese folk medicine, for the treatment of arthritis, diabetes and rheumatis. Recently two new flavonoids have been isolated from its leaves (Wang et.al., 2009) and the antioxidant profile of different parts of this specie has also been studied (Iqbal and Khan, 2010). Morus rubra L. is a medium sized (15–20 m) tree; its leaves are of great importance in folk medicine and are reported to have many phytochemical constituents and biological activities (Sharma et.al., 2010). Recently, many studies have shown antioxidant, antiviral, antiinflammatory, hypolipidemic, anti-hyperglycemic, neuroprotective, anti-HIV, anti-hypotensive and cytotoxic activities of different species of Morus (Du et.al., 2003). Mulberry leaves have shown strong antioxidant properties in rice bran oil and inhibition of oxidative deterioration of oil was observed to be even better than synthetic antioxidants (Roy et.al., 2009). Some reports have attributed these salient features to the many phytochemical constituents present in mulberry leaves. Mulberry leaves can balance internal secretions and enhance immunity. It promotes proper body fluid production. People suffering from body fluid deficiency could take ten grams of mulberry leaves daily with water. Mulberry is useful for the persons who use their eyes a lot during work. Regular consumption of mulberry strengthens evesight. Presence of nutritious elements like minerals and vitamins in mulberry helps in curing chronic diseases. Mulberry leaves are helpful for proper gastric juice secretion, enhances appetite, and also improves the ability for digesting and assimilating, fight problems like chronic gastritis and chronic hepatitis, curing health problems like anemia, pallor, dizziness, heart-palpitations and insomnia., promotes healthy growth of hair and blackening. Nutritious value of Mulberry enriches the blood and in the process, soothes the nerves. Mulberry can suppress mutagenesis of carcinogens. Regular use of Mulberry prevents cancer of liver. Mulberry is helpful in reducing level of blood sugar (Lin and Lai, 2009). Hence the present study was undertaken with the aim to develop mulberry leaves based tomato soup and to assess its organoleptic and nutritional qualities.

Material and methods:-

Basic ingredients for Tomato Soup preparation were purchased from the local market of Allahabad. Mulberry leaves were collected and washed with water. After washing, it was soaked for 15 min. in water having sodium bicarbonate and salt (1:1) then it was drained and subjected to steam blanching for 10 min. After draining it was dried by using hot air oven at 70°C for one hour then dried leaves were finely powdered (Srivastava and Kumar, 2009). Mulberry leaves was used for development of value added products namely *Tomato soup*. Along with control (T_0), four variations (T₁, T₂, T₃ and T₄) were prepared which contains mulberry leaves at 0.8%, 1%. 1.2%, 1.4% respectively. The product "tomato soup" on the day of manufacture were evaluated organoleptically by panel of 10 judge selected randomly. The judges were requested to score the coded products of 9 hedonic rating score card specially prepared for the purpose according to their feeling and choice (Srilakshmi, 2007). After scoring the average score were calculated for each product. Chemical compositions of products were assessed using standard procedure. Crude fat, fiber, ash, moisture and carbohydrate were analyzed by following the AOAC (2000). The Soxhlet method was used for total fat determination using ether for oil extraction. Crude fiber was obtained after samples digestion with diluted acid, alkali and alcohol. Moisture was determined from sample weight loss after drying at 105° C until constant weight obtained. Protein content was determined by Micro Kjeldahl method and Carbohydrate was calculated by difference method. Calcium estimation was done by potassium permanganate titration and iron estimation was done by Atomic Absorption spectroscopy. Data obtained from the organoleptic and chemical analysis subjected to analysis of variance technique and difference was found to determine the best treatment (Gupta and Kapoor, 2002).

Results and discussion:-

Average sensory scores of different parameters in control and treated sample of *Tomato soup* in relation to colour and appearance had the highest in T_0 , treatments have significant influence. Consistency was highest in T_0 CD value was 0.60 and treatments had significant influence. Mean score for Taste and flavour was the highest T_3 , treatments had significant influence and CD value was 0.66. T_3 had obtained highest mean score for Overall acceptability, treatments had significant influence and CD value was 0.34.

There was a significant difference between the various sensory attributes of control and treatments as the calculated value of F is found to be more than the Tabulated value of F at 5% probability level. This indicates that the addition of different proportions of mulberry leaves affect the overall acceptability of the prepared products. Energy, protein, fat, Calcium, Fiber, and Iron was found highest in T_3 than T_0 except Carbohydrate as shown in Table 1.



Fig.1. Different sensory attributes of Tomato Soup prepared by utilization of mulberry leaves powder

Nutrients	Control	Treatment	Difference	T (Calculated)	T (Tabulated)	Result
	(T ₀)	(T ₃)	$(T_3 - T_0)$		$t_{0.05, 2}$	
Energy (kcal)	69	92	23	61.5	4.30	S
Protein (g)	1.5	3.5	2.0	5.6	4.30	S
Fat (g)	3.0	5.7	2.7	8.2	4.30	S
Carbohydrate (g)	9	7.5	-1.5	2.3	4.30	NS
Crude fiber (g)	0.05	1.2	1.15	5.1	4.30	S
Calcium (mg)	165.5	220.0	54.5	159.2	4.30	S
Iron (mg)	1.4	2.1	0.7	4.1	4.30	NS
Vitamin C (mg)	48	62	14	59	4.30	S

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Conclusion:-

It can be concluded that the developed product (T3 - 1.2%) has good sensory and nutritional qualities. Fresh mulberry leaves were dried by hot air oven drying method provides a concentrated form of nutrients. *Tomato soup* with mulberry leaves has preventive and curable role in Growing children, cancer and osteoporotic patients. It aids variety in a regular diet.

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