ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 02 | February - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

DEVELOPMENT OF HERBAL TEA FROM MORINGA OLEIFERA FORTIFIED WITH GINGER AND TEA LEAF POWDER

Engineering

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ABSTRACT

Tea in general and herb tea in particular, are gaining increasing consumer attention due to a growing awareness of health benefits derived from their consumption. The study was undertaken with the objectives to study the development of herbal tea fortified with *Moringa Oliefera* and Ginger powder. The objectives of the study were to formulate herbal tea from *Moringa Oleifera*. The herbs were properly dried. Standard methods were used to measure proximate parameters like Chemical and Microbial. Fifteen (15) panelists conducted sensory tests on infusions from five formulations. Results of chemical analysis revealed that Moringa, Ginger and Tea leaves had respectively, protein of 12.3%, 5.8%, 4.7%; Ca (mg/100) of 19.6%, 14.8% and 19.9%; Fe (mg/100) of 2.8%, 3.2% and 9.8%; Herb tea brewed from product T_2 (60% Moringa, 20% Ginger and 20% Tea leaves) was founds the most preferred in colour, flavour, Taste, Appearance and overall sensory properties while the control (100% Moringa) brewed the least preferred herb tea in most of the sensory attributes. Product T_2 was predominantly Pale yellowish in colour while the control was Brownish. Product T_2 had high mean scores for color (8.2), Taste (7.6), flavor (7.8), Appearance (8) and Overall Acceptability (8) while the T_4 had significantly low scores for most of these attributes. Herb tea from blend of Moringa, Ginger and Tea leaves was more appealing than herb tea from only Tea Leaves.

KEYWORDS

Moringa Oleifera, Herbal Tea, proximate Parameters.

1. INTRODUCTION

The drinking of tea begun in China centuries ago, and has over the years become an inseparable part of most cultures worldwide. Tea is currently the most widely consumed beverage in the world **(Schmidt *et al.*, 2005)** and therefore ranks as an important world food product.

Tea is generally consumed for its attractive aroma and taste as well as the unique place it holds in the culture of many societies. In recent times, there is renewed interest in tea because of growing consumer awareness of health benefits derived from tea consumption **(Balentine*et al.*, 2005).** Tea therefore belongs to a rapidly expanding market of 'wellness beverages' **(Byun and Han, 2004).**

By definition, tea is an infusion of the leaves or other parts of the evergreen tea plant (*Camellia sp*). Teas have been traditionally categorized into green, oolong and black teas according to the processing conditions employed during manufacturing **(Kirk and Sawyer, 1997).** In recent times, however, a fourth category, called herb teas, is gaining increasing popularity among consumers. Unlike traditional tea, Tea is the processed leaves of *Camellia sinensis* which upon infusion with cold or hot water gives a non-alcoholic beverage **(Sharma *et al.*, 2005).** Tea consumption is a very ancient habit, with legends from China and India indicating that it was initiated about five thousand years ago **(Dufresne and Franworth, 2001).**

Traditionally, tea was consumed to improve blood flow, eliminate toxins and improve resistance to diseases **(Balentine *et al*., 1997).** According to **Hertog*et al.* (1993)**, numerous epidemiological studies linked tea consumption to reduction of the risk of cardio vascular diseases, high cholesterol levels, diabetes **(Vinson *et al*., 2001),** arthritis **(Haqqi *et al*., 1999),** osteoporosis **(Hegarty*et al*., 2000)** and dental carries. Polyphenols are the most biologically active group of tea components (Park *et al*., 2012), which possesses antioxidative, antimutagenic and anticarcinogenic effects **(Yao *et al*., 2004).**

Tea preparation follows a simple procedure. Hot water (70 °C to 100 °C) is poured over the plant part(s) in a container and allowed to steep for a few minutes (usually 1 – 5 min) after which the plant material, usually contained in a bag, is removed from the container. The temperature of the water used and the duration of steeping affect the 'strength' of the tea. Tea is drunk hot, warm or iced. In some cases, milk and/or a sweetener such as honey or sucrose may be added before drinking **(Hakim *et al.*, 2000).**

According to **Abbey and Timpo (1990),** indigenous herbs are in general heavily under-exploited in spite of their huge dietary potential. It is therefore imperative to explore the potential of indigenous plant materials in the development of new herb teas. The examples of indigenous plants discussed in this thesis are *Moringa oleifera* (Moringa), *Zingiber officinale* (Ginger), *Spinacia Oleracea* (Spinach) and (Tea leaves).

Moringa is an easily propagated plant which thrives well in harsh environmental conditions. It is increasingly gaining global attention due to an excellent profile of nutrients and antioxidants. *Moringa* leaf is rich in minerals, amino acids, vitamins and -carotene. It also contains a rare combination of health-promoting antioxidants: zeatin, quercetin, sitosterol, caffeoylquinic acid andkaempferol**(Anwar *et al*., 2007).** Currently, there is growing interest in the use of *Moringa* leaves as an ingredient in the preparation of herb tea.

"The Miracle Tree" owing to their multipurpose applications including as a source of food, medicine, edible oils, biofuel and applications for water sanitations. While the chemistry and pharmacology of the Indian *Moringa* along with its usage have been exhaustively studied, the scientific evidence to justify the multipurpose usage, the message of *Moringa* utilisation also appeared to be well received by consumers, and both fresh and dried powdered leaves of M. stenopetala are now widely sold in cities of Ethiopia and abroad as nutritional supplements **(Solomon Habtemariam *et al*., 2017)**.

OBJECTIVES

1. Formulation of herbal tea from *Moringa Oleifera*.
2. Evaluation of Quality characteristics of developed herbal tea.
3. Study of sensory evaluation of herbal tea from *Moringa Oleifera*.

2. MATERIALS AND METHODS

The present investigation "**Development of Herbal Tea from *Moringa Oleifera* fortified with Ginger and Tea Leaf powder**" was conducted at Department of Food Process Engineering, Vaugh Institute of Agricultural Engineering and Technology, Allahabad

2.1. Material Requirement

2.1.1. Selection of raw material: Raw material for preparation of Herbal Tea were *Moringa* Leaves, Ginger, Tea leaves which was been purchased from the local market of the Allahabad.

2.1.2. Processing equipment: Sieve, Electronic weighing balance,

soxhlet apparatus, micro-Kjeldahl apparatus, muffle furnace, grinder (mixer).

2.1.3. Packaging material (Preparation of Tea Bags): The tea bags material was made using heap fill tea bags filter paper. The filter paper was been cut with a pair of scissors into rectangular shapes of 12 x 10cm after which it was been folded and the two sides was sealed with an electrical hand heat sealing machine and then was refilled with the crushed dried *Moringa* Herbal tea powder and then the top was also sealed by passing a thread (piece of string) that served with a paper label attached to the tea bag as a handle for dipping in the water after filling with 2g of each bag.

2.1.4. Chemical Analysis: Determination of moisture, protein, fat, carbohydrate, ash, pH by AOAC (2005), AACC (2003) method. The carbohydrates are estimated by using difference method. Mineral content viz. calcium, iron, magnesium, etc, of herbal tea were measured by the standard methods (Ranganna, 1986).

2.2 Methodology

2.2.1. Formulation and Standardization of Herbal Tea using different proportion:

Formulation and standardization of herbal tea using different proportion of *Moringa* Powder and Tea Leaves Powder was carried. The data are showed in table 1.

Table 1. Formulation and standardization of Herbal Tea by using different proportion of Moringa powder and Tea leaves powder in different sample.

Treatments	Moringa Powder (%)	Ginger Powder (%)	Tea leaf Powder (%)
T_0	0	0	100
T_1	70	20	10
T_2	60	20	20
T_3	50	20	30
T_4	40	20	40

2.2.2. Experimental procedure

Moringa Powder+ Ginger Powder + Tea leave Powder
↓
Sieving
↓
Weighing all ingredient
↓
Proper mixing
↓
Formulation
↓
Packing in tea bags
↓
Sealing bag using thread to dip
↓
Moringa Tea

Flowsheet 1. Process flow chart for *Moringa* Herbal Tea

2.3. Statistical analysis: Statistical analysis was carried out by using (CRD) for different treatments as per the methods given by Panse and Sukhatme (1985).

3. RESULTS AND DISCUSSION

On this regard, in the present investigation, efforts have been made to develop the herbal tea from *Moringa Oleifera*. The efforts were also made to develop technology for formation of herbal tea by utilizing *Moringa Oleifera* as a novel ingredient in formulation of herbal tea by varying proportion of *Moringa Oleifera* and Tea leaves powder. Furthermore, the formulated product was evaluated for storage and microbial characteristics in order to predict the shelf life. The results obtained are discussed as follows.

3.1. Sensory analysis of Herbal Tea

Sensory analysis of herbal tea of sample T_0, T_1, T_2, T_3, T_4, was carried out on the basis of color, flavor, taste, and overall acceptability with the help of sensory evaluator on 9-point hedonic scale and the results are depicted in Table-2.

Table 2. Sensory analysis of Herbal Tea

Sample	Color	Taste	Flavour	Apperence	Over All
T_0	9.000	9.000	9.000	9.000	9.000
T_1	7.000	6.889	7.000	7.000	6.889
T_2	8.111	7.444	7.778	7.889	7.889
T_3	7.333	6.889	6.667	7.000	6.889
T_4	7.111	6.444	6.222	7.000	6.889
T_5	6.556	6.222	6.111	6.333	6.444
F- test	S	S	S	S	S
C.D.	0.662	0.698	0.666	0.818	0.742
SE(m)	0.231	0.243	0.232	0.285	0.259
SE(d)	0.326	0.344	0.328	0.403	0.366
C.V.	9.211	10.208	9.770	11.611	10.587

*Each value is a mean of three determination

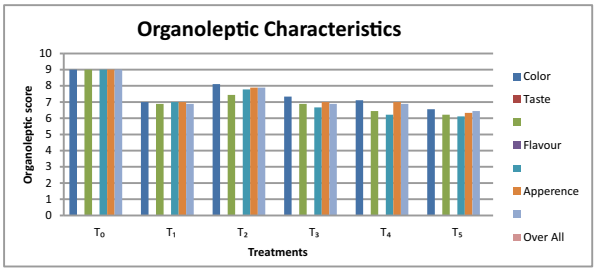

Fig. 1: Sensory analysis of Herbal Tea

Organoleptic characteristics are the most important properties of Herbal Tea for its consumer acceptability. The data pertaining to organoleptic evaluation showed that colour, taste and appearance of T_2 was similar to that of control (T_0). Considering all sensory quality parameter, the overall acceptability of T_2 was found highest followed by T_1 and T_3. The overall acceptability score was varied significantly with respect to tea each other. The highest score was achieved by T_2 (i.e. 7.88). It could be concluded that the further analysis of herbal tea was carried out of sample T_2 due to its highest overall consumer acceptability.

3.2. Physical properties of Herbal Tea

The developed *Moringa* Herbal Tea was analyzed for their physical properties such as Total soluble solids (TSS) and pH. TSS content of tea was determined by the index of refraction. It is widely used during processing of tea to determine the sugar concentration in the products. Developed Herbal Tea was also analyzed for determination of pH. The data pertaining to physical parameters are depicted in (Table-3)

Table 3. Physical properties of Herbal Tea

Physical properties	Average value
TSS	4
ph	5.0

*Each value is a mean of three determination

Moringa samples had pH values of 5.0 respectively. All the values were significantly different ($P < 0.05$). Infusions from Moringa leaves were slightly acidic probably due to the high content of heavy metals or constituent oxalic, phenolic and chlorogenic acids (Fuglie, 2001). The pH of a sample affects the sensory character of the sample. Low pH results in sour and astringent products.The results showed in Table-3 recorded lowest total soluble solids (4 per cent). The average value of p^H was found to be 5 respectively.

3.3. Nutritional properties of Herbal Tea

Nutritional composition generally represents the nutritional quality of product. It is necessary to observe the nutritional composition of herbal tea so as to judge the nutritional quality of final product. The data pertaining to nutritional composition of herbal tea is depicted in Table 4.

Table 4. Nutritional properties of Herba Tea

Nutritional properties	Mean value
Moisture (%)	5.52
Carbohydrate (%)	9.6
Fat (%)	3.03
Protein (%)	20.6
Ash (%)	2.5
Iron (mg)	9.8

*Each value is a mean of three determinations

The results of nutritional composition revealed that herbal tea is good source of protein, iron and carbohydrate content. It is observed from the Table-4 that the moisture content of herbal tea was found to be 5.52 per cent. The fat content of herbal tea was found to be 3.03 per cent. The protein content of herbal tea was found to be 20.6 per cent. The ash content of herbal tea was found to be 2.5 per cent. The iron Fe (mg/100g) content of herbal tea was found to be 9.8 per cent. Similar range of percent chemical composition was reported by **krick and sawyer *et al*. (1977).**

4. CONCLUSION

- Blending *Moringa* and Ginger powder produced an herb tea with more appealing characteristics.
- The result of the chemical analysis showed the *moringa* could potentially exert the strongest influence on the sensory character of the beverage.

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