The Pharma Innovation Journal 2023; 12(12): 625-628

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(12): 625-628

www.thepharmajournal.com
Received: 02-09-2023
Accepted: 03-10-2023

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Nutritional characterization of Indian traditional herbs: Basil, Adulsa and Mint leaves

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Abstract
In the fields of Ayurveda and traditional medicine, tulsi (*Ocimum sanctum*), adulsa (*Adhatoda vasica*), and mint (Mentha piperita) are gems that are valued for generations in the quest for overall health and well-being. Ayurveda is so simply incorporated into our way of life; it is known as the science of life. Since Ayurveda has less side effects than conventional medicine, it has gained a lot of prominence and attention. Ayurveda uses medicinal plant leaves, roots, and fruits to treat a variety of disorders. Therefore, one of the newest areas of study in the healthcare industry is Ayurveda. The study examined the physical properties, colour attributes, proximate and mineral composition of fresh tulsi, mint and adulsa leaves.

Keywords: Adulsa, ayurveda, mint, tulsi, physical properties, proximate composition and mineral analysis

1. Introduction
Since ancient times, plants have been the main source of medicinal compounds. The different bioactive secondary metabolites that medicinally significant plants contain have multiple advantages of therapy. Since medicinal plants are widely available, effective, and have less side effects than other options, they are beneficial for a variety of treatments (Pathak and Niraula, 2019) [15].

Tulsi, or *Ocimum sanctum* in Urdu, is a member of the Lamiaceae family of herbs. Because of its many therapeutic benefits, it has contributed significantly to science both historically and currently. As one of the most revered and holy of the various orient's healing and health-giving herbs, tulsi is known as the "Incomparable one" of India. Shafqatulla (2013) [19]. Tulsi lowers blood sugar and has antioxidant qualities. It lowers overall cholesterol So, it's helpful in people with cardiac disease. It relieves tooth aches when used as mouthwash. Tulsi oil exhibits larvicidal properties towards malarial larvae. Mentha piperita or peppermint, is one of the most commonly used aromatic herbs. The hybrid species Mentha piperita L. is a member of the Lamiaceae family (Nieto, 2017) [14]. Within the Lamiaceae family, which includes 25–30 species worldwide, in addition to being an edible and flavourful ingredient, it finds usage in cosmetics and has numerous uses in the medical and pharmaceutical sectors (Rashid *et al*., 2023) [17]. Mint use in the treatment of throat irritation, mouth and sore throat (Al-Bayati 2009) [4]. Aqueous extract of mint leaves has antinociceptive and antipyretic properties (Amabeoku *et al*., 2009) [5]. Mint leaves used in herbals formulations which is used for gastrointestinal disorders (Mikaili *et al*., 2013) [12].

Vasica, or *Justicia Adhatoda*, is a well-known medicinal plant in Ayurvedic and Unani medicine. It belongs to the Acanthaceae family and has an enormous amount of biological potential. For almost two millennia, the herb has been utilized in India's traditional medical system. Sharma *et al*. (2018) [21]. This bush is found all across the world, and its leaves, bark, and flowers are all utilized in medicine. The leaves are well known for being an effective treatment for bronchitis and coughing (Hossain and Obydul 2016) [8]. Generally, smoke from leaves is used to treat asthma, and yellow leaves are utilized to treat coughs (Lal and Yadav, 1983) [11] and Leaf decoction and ash are used to treat bronchial issues like tuberculosis and asthma (Jain and Puri, 1984) [9].

2. Materials and Methodology

2.1 Collection of materials

The required material for present investigation were collected from local market of Parbhani.

2.2 Physical characteristics

Shape observed by visually and length of basil leaves, adulsa leaves and mint leaves were calculated by using vernier calliper.

2.3 Proximate composition

Basil, adulsa and mint leaves were analyzed for fat, protein, crude fibres according to AACC (2000) [1], Carbohydrate by difference method and moisture, ash as per methods of AOAC (2005) [2].

2.4 Colour analysis

Color represents a visual characteristic, and the analysis of color in the samples was conducted following the procedure outlined by Rajiv *et al*., (2015) [16]. This analysis utilized a Hunter Lab Colorimeter, specifically the Colour Flex EZ model, located in the Department of Horticulture at the College of Horticulture, VNMKV, Parbhani. To ensure accuracy, the instrument underwent calibration using a standard reference tile with a light-yellow color (characterized by L* = 77.14, a* = 1.52, b* = 21.88). The colorimeter was set up with 100 observers and a 450/00 geometry. Readings of L* (where 0 represents black and 100 indicates white), a* (positive values denoting red and negative values indicating green), and b* (positive values representing yellow and negative values suggesting blue) were recorded from a glass cell containing the sample. This cell was positioned above the light source and covered with a white plate. The color index conveyed information about the lightness, redness, and yellowness of the sample. The Hunter Lab colorimeter quantified the color in terms of values for L*, a* and b*providing insights into chroma (c*) and hue (h*) by referencing a standard white tile or board during instrument configuration with the illuminate.

3. Results and Discussion

3.1 Physical characteristics of basil Leaf, adulsa Leaf and mint Leaf

Physical characteristics of fresh basil Leaf, adulsa Leaf and mint Leaf were characterized by their colour, shape and length. All these characteristics are studied and average value reported in Table 1.

Fig 1: Tulsi leaves

Fig 2: Adulsa leaves

Fig 3: Mint leaves

Table 1: Physical characteristics of basil Leaf, adulsa Leaf and mint Leaf

Parameters	Basil Leaf	Adulsa Leaf	Mint Leaf
Colour	Greenish	Green	Greenish
Shape	Oval pointed and sharp	Lance	Oblong shape
Length (cm)	3	17.5	4

From the Table 1 it was observed that the basil Leaf has greenish colour and has oval pointed and sharp in shape the length of basil Leaf measure by using vernier caliper and found to be 3 cm. The data reported in the Table was found similar with result reported by Kadian and Parle (2012) [10].

Length of adulsa leaves was 17.58 cm. The shape and colour was observed visually and the shape of leaves was found to be lance and colour was light green. These results were similar with Shah *et al*. (2015) [20].

Colour of mint leaves was greenish noted manually. The shape of mint leaves was oblong and length was 4 cm. These results were found similar with result reported by Adde *et al*. (2021) [3].

Table 2: Hunter colour analysis of basil Leaf, adulsa Leaf and mint Leaf

Colour values	Basil Leaf	Adulsa Leaf	Mint Leaf
L*	35.59±0.17	32.49±0.20	36.3±0.41
a*	-8.38±0.26	-10.45±0.13	-8.10±0.15
b*	19.67±0.42	19.01±0.47	18.78±0.44
c*	20.86±0.06	22.87±1.39	21.86±0.45
h*	113.65±0.56	116.7±0.42	114.5±0.15

From the Table 2 it was observed that L* value i.e. darkness to lightness of basil Leaf, adulsa Leaf and mint Leaf was 35.59 32.49 and 36.3 respectively. a* value i.e. greenness to redness of basil Leaf, adulsa Leaf and mint Leaf was -8.38, -10.45 and -8.10 respectively. Negative value indicates that it contains green colour. b* value i.e. blueness to yellowness of basil Leaf, adulsa Leaf and mint Leaf was 19.67, 19.01 and 18.78 respectively. c* value i.e. Chroma of basil Leaf, adulsa Leaf and mint Leaf was 20.86, 22.87 and 21.86 respectively. h* value i.e. hue of basil Leaf, adulsa Leaf and mint Leaf was 113.65, 116.7 and 114.5 respectively.

Table 3: Proximate chemical composition of basil Leaf, adulsa Leaf and mint Leaf

Parameters (%)	Basil Leaf	Adulsa Leaf	Mint Leaf
Moisture	77.80±1.25	15.30±1.19	82.0±2.35
Fat	0.38±0.02	1.77±0.22	0.70±0.01
Protein	0.90±0.01	6.14±0.97	3.20±0.89
Carbohydrates	17.92±1.45	68.13±2.75	9.60±1.02
Ash	1.40±0.09	2.16±0.15	2.00±0.16
Crude fiber	1.6±0.17	6.5±0.96	1.7±0.21

The proximate chemical composition of basil Leaf, adulsa Leaf and mint Leaf revealed in the Table 3.3. Moisture content of basil Leaf was 77.80±1.25. fat content was 0.38 %±0.02, protein content was 0.9±0.01 per cent, carbohydrates content was 17.92±1.45 per cent, ash content was 1.40±0.09 per cent and crude fiber was 1.6±0.17 per cent. These results were found similar with results reported by Saxena and Chaturvedi (2015) [18]. Moisture content of adulsa Leaf was 15.30±1.19 per cent. Fat content was low in concentration 1.77±0.22 per cent. Protein content was 6.14±0.97. Leaves contain higher concentration of carbohydrate content 68.13±2.75 per cent. Ash content of leaves was 2.16±0.15 per cent and crude fiber was found to be 6.5±0.96 per cent. This proximate chemical composition was found to be more or less similar with the result found by Gedam *et al*. (2017) [6], Gulfraz *et al*. (2005) [7]. Moisture content 82.0±2.35 per cent. Fat, protein, carbohydrates, ash, crude fiber was found that0.70±0.01 per cent, 3.20±0.89 per cent, 9.60±1.02 per cent, 2.00±0.16 per cent, 1.7±0.21 per cent respectively. These results were found similar with results reported by Naureen *et al*. (2022) [13], Adde *et al*. (2021) [3].

Table 4: Minerals composition of basil Leaf, adulsa Leaf and mint Leaf

Minerals (mg/ 100 g)	Basil Leaf	Adulsa Leaf	Mint Leaf
Calcium (Ca)	40.23±1.23	6810.00±5.63	231.25±2.36
Phosphorous (P)	1.72±0.21	0.31±0.02	60.23±1.25
Potassium (K)	11.55±1.21	3106.15±10.25	0.21±0.01
Iron (Fe)	34.42±1.25	72.56±1.11	15.26±0.23
Zinc (Zn)	0.96±0.01	14.61±1.21	0.39±0.01
Copper (Cu)	0.27±0.02	1.72±0.03	0.56±0.05

The Table 4 represents the results of mineral content of the basil Leaf, adulsa Leaf and mint Leaf in mg /100g. Minerals namely calcium, copper, iron, zinc, potassium, and phosphorous were estimated from basil Leaf found to be 40.23±1.23 mg per 100 g, 0.27±0.02 mg per 100 g, 34.42±1.25 mg per 100g, 0.96±0.01 mg per 100 g, 11.55±1.21mg per 100 g, 1.72±0.21 mg per 100 g. respectively. These results were more or less similar with the results demonstrated by shafqatullah *et al*., (2013) [19]. The mineral present in adulsa Leaf were calcium, copper, iron, zinc, potassium, and phosphorous found to be 6810.00±5.63 mg per 100 g, 1.72±0.03 mg per 100 g, 72.56±1.11 mg per 100 g, 14.61±1.21mg per 100 g, 3106.15±10.25 mg per 100 g, 0.31±0.02 mg per 100 g respectively. These values are more or less similar with the result reported by Gedam *et al*. (2017) [6]. The mineral present in mint Leaf were calcium, copper, iron, zinc, potassium, and phosphorous found to be 231.25±2.36 mg per 100 g, 0.56±0.05 mg per 100 g, 15.26±0.23 mg per 100 g, 0.39±0.01 mg per 100 g, 0.21±0.01mg per 100 g, and 60.23±1.25 respectively. These values are more or less similar with the result reported by Naureen *et al*. (2022) [13].

4. Conclusion

It can be concluded from study that the physical parameter, proximate and mineral composition of basil, adulsa and mint Leaf were studied. Leaves are the rich source of minerals and having many health benefits, therefore these leaves are recommended for the exploration and utilization in value added products.

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