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THE EXTRACTION AND PHYTOCHEMICAL SCREENING OF CERTAIN FLAVOR ENHANCING HERBS

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ABSTRACT

The flavor-enhancing herbs such as Curry leaves (*Murraya* koenigii), Indian Bay leaves (*Cinnamomum Tamala*), and Mint leaves (*Mentha Piperita)* are added to various foods and drinks to enhance their natural flavor. By extracting these leaves with the maceration process it was found that these leaves consisted of various phytochemicals such as alkaloids, tannins, flavonoids, terpenoids, glycosides, and phenolic compounds. Also, these leaves consist of volatile compounds. So, the essential oil from these leaves was extracted by hydrodistillation process using Clevenger apparatus.

KEYWORDS: *Murraya Koenigii* leaves, *Cinnamonum Tamala* leaves, *Mentha Piperita* leaves, Phytochemicals, Essential oil, and flavor-enhancing herbs.

INTRODUCTION

The concept of flavor enhancement originated in Asia, to provide a richer flavor to certain foods and drinks. The flavor of foods results in the stimulation of chemical senses of taste and smell by specific food molecules.[1] Traditionally, herbs and spices have been used as a flavor enhancer in food as well as in drinks. The antimicrobial properties of the flavor enhancers help to extend the shelf life of the food products.[2]

Flavor is a sensory phenomenon that is a combination of the sensations of taste, odor or aroma, heat, cold, and texture or mouthfeel. Natural flavoring materials such as spices, essential oils, and fruit juices have been used for long duration of time in food preparations. The substances which are mainly responsible for the aroma of food products are volatile compounds. Thousands of natural flavoring compounds are present in food. Some of them are flavonoids which are responsible for flavour and terpenoids are ubiquitous in plant foods. Also, many other volatile components are present which contribute to the aroma of food.[3]

Figure 1: Flavour enhancing herbs.

There are different categories of food and drink flavor enhancers based on their parts:[4]

Table 1: Different types of flavour enhancers.

Seed	Cumin, fenugreek, coriander, fennel, ajwain and mustard.
Bark	Cinnamon and cassia
Fruit	Chili and cardamom
Leaf	Mint, curry leaves, Indian bay leaves and rosemary.
Rhizome	Turmeric and ginger

From the above-mentioned flavour enhancers, we have selected three natural flavour-enhancing leaves for our study which are as follows.

1. Curry leaves [*Murraya koenigii*]
2. Indian Bay Leaves [*Cinnamomum Tamala*]
3. Mint Leaves [*Mentha Piperita*]

They were collected from Matoshri Nursery, Umari, Mandava Road, Wardha and authenticated by Bajaj College of Science, Wardha.

Description of Curry Leaves [*Murraya koenigii*]

The curry tree, *Murraya koenigii* is a tropical and sub-tropical tree in the family Rutaceae native to Asia. Its leaves are known as curry leaves and are used in many dishes in India. It is a small tree, growing 4–6 meters (13–20 ft)) tall, with a trunk up to 40 cm in diameter. The aromatic leaves are pinnate, with 11–21 leaflets, each leaflet 2–4 cm long and 1–2 cm broad. The plant produces small white flowers which can self-pollinate to produce small shiny-black drupes containing a single, large viable seed. The berry pulp is edible, with a sweet flavor.[5]

Plant profile

Figure-2: Curry leaves.

Taxonomy[6]

Table-2: Taxonomy of Curry leaves.

Kingdom	**Plantae**
Sub-kingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliospida
Subclass	Rosidae
Order	Sapindales
Family	Rutaceae
Genus	Murraya J. Koenig ex L.
Species	*Murraya Koenigii* L. Spreng

Synonyms: English: Curry Leaves, Hindi: Mitha neem, Marathi: Kadhipatta and Godnimb.

Chemical constituents in *Murraya Koenigii*[7]

Curry leaves contain various phytochemicals which can vary depending on factors such as the plant's age, location, and environmental conditions. They mainly include Alkaloids such as merocyanine, kokusagine, and mahanine. Flavonoids such as quercetin, kaempferol and

luteolin Terpinoids such as beta caryophyllene, beta pinene, and alpha pinine. Glycosides such as koenigoside. Beta-caryophyllene is the major constituent responsible for the aroma of curry leaves. Beta-caryophyllene is the major constituent responsible for aroma in curry leaves.

Health Benefits

1. Curry leaves are good for reducing cholesterol.
2. The herb is rich in Vitamin A which is essential for good eyesight.
3. They are loaded with ions and folic acid, which helps to maintain the RBC count of blood.
4. The leaves possess anti-bacterial properties and help to fight various infections of the body.

Description of Indian Bay Leaves [*Cinnamomum Tamala*]

Cinnamomum Tamala also known as Tejpat, belongs to the family Lauraceae. It is a remarkably exposed tree in India, China, Nepal, Bhutan, and Bangladesh. It is a perennial small evergreen plant that is long up to 8-12 meters in height and with a girth of 150 cm.

Leaves of the plant are thickened, pointed/acuminate ovate. It is 12-20 cm in length and 5-8 cm in width. Young leaves are reddish-pink and after sometimes leaves colour changes into dark green which gives a glossy appearance. Leaves consist of a three-man line from the base to the top.

Plant Profile

Figure-3: Dried Indian Bay Leaves.

Taxonomy

Table 3: Taxonomy of Indian Bay Leaves.

Kingdom	**Plantae**
Subkingdom	Tracheobionta (Vascular Plant)
Division	Magnoliophyta
Class	Magnoliopsida
Order	Laurales
Genus	Cinnamomum Schaeffer
Biological source	It consists of dried leaves of *Cinnamomum Tamala* species.
Family	Lauraceae
Common Name	Cinnamomum Albiflorous Nees, Tejpata

When the leaves of this spice are crushed it produces aroma, though dried leaves are more aromatic. It is used to impart flavor to a variety of dishes of various cuisines around the world.[8]

Synonyms: English: Indian Bay Leaf, Indian cassia, Hindi: Tejpatta, Tej pat, Marathi: Tamal Patra.

Chemical constituents[9]

Linalool, eugenol, cinnamaldehyde, alpha-pinene, Camphene, methyl eugenol, limonene, beta–caryophyllene, etc.

Eugenol and linalool belong to a phenolic group. Alpha-pinene, camphene, limonene, alpha-terpineol, and beta-caryophyllene belong to the terpenoids group. Kaempferol belongs to flavonoids. Methyl eugenol-beta -D-G-glucopyranoside belongs to glycosides. Lauricidine and cinnamolaurine belong to alkaloids. Gallotannins belong to the tannins group.

Cinnamomum tamala consists of eugenol as a major aromatic component belonging to a phenolic group.

Health Benefits[10]

1. Indian bay leaves are used in the treatment of diabetes.
2. Used in the treatment of menstrual problems.
3. Treatment of cold and infection.
4. Treatment of nosebleed.

Description of Mint Leaves [*Mentha Piperita*][11]

Mentha Piperita commonly known as peppermint belongs to the family Laminaceae.

The main aim of cultivating this plant is to produce peppermint oil (waxy white crystalline monoterpene substance, solid at room temperature) around the world. India plays a dominant role in the production of mint oil and menthol in the world market. The herb is mainly indigenous to Europe and widely spreads all over the world. It is found in Australia, Asia, the Galapagos islands, New Zealand, the United States, and India. The mint leaves are opposite, petiolate having 4-9 cm long and 1.5-4 cm broad, pointed, and dark green on the upper surface of the herb.

Plant profile

Figure-4: Peppermint Leaves.

Taxonomy

Table 4: Taxonomy of Peppermint Leaves.

Kingdom	**Plantae**
Binomial	Mentha piperita Linn
Class	Magnoliopsida
Order	Lamiales
Family	Laminaceae
Genus	Mentha
Species	Piperita

Synonyms: English: Peppermint, Marathi: Pudina, Hindi: Pudina.

Chemical constituents: Menthol, menthone, alpha-pinene, beta-pinene, limonene, neomenthol, menthofuran, etc.

Menthol, menthone, limonene, and 1,8-cineole belong to the terpenoid group. Methylamine and piperidine belong to the alkaloids group. Rosmarinic acid, and luteolin -7-o-glucoside

belong to the flavonoids group, and gallotannins, and procyanidins belong to the tannins group, etc.

Menthol and menthone are the major components responsible for the aroma of mint leaves.

Health Benefits[12]

1. Remove toxins from the body, soothes itching, inflammations, and burns, and eliminate blackheads.
2. Aids in digestion.
3. Relieves menstrual cramps.
4. Eliminate bad breath and keep teeth and gums healthy.

MATERIALS AND METHODS

Methods Of Extraction

There are different methods of essential oil extraction.[13,14]

a. Hydro distillation (Clevenger Apparatus)
b. Steam Distillation
c. Supercritical Fluid Extraction
d. Microwave Assisted Extraction

We have selected the hydrodistillation method for essential oil extraction from the above-enlisted methods and the maceration method for the preparation of extract.

Hydrodistillation Method

Collection of Sample

All three samples collected from the local market included fresh curry leaves (3.6 kg), dried Indian Bay leaves (2.5 Kg), and fresh mint leaves (1.5 Kg).

Then the fresh leaves were dried, and moisture was removed from all three samples by using a hot air oven and subjected to crush.

Hydrodistillation Process

i. The crushed dried leaves of all three samples were weighed and particularly put into the round bottom flask of Clevenger Apparatus.
ii. A sufficient amount of distilled water was added as a solvent into the round bottom flask until the crushed leaves were dipped.

iii. The process was conducted in three to four batches.
iv. Then assembly for each batch was kept for 6-7 hours at 80 °C and further, it was adjusted according to requirement.
v. Essential oil was observed at the wide receiver tube of the apparatus above the aqueous phase.
vi. Lastly, the essential oil was separated from the tube collected in a vial, and stored in the freezer.

Figure-5: Hydrodistillation Process (Clevenger Apparatus).

METHODS OF PREPARATION OF EXTRACTS

Maceration Process of Extraction

1. The plant leaves were taken.
2. The leaves were crushed, weighed, and placed in a beaker.
3. A sufficient quantity of solvent [ethanol] was poured into the crushed leaves.
4. And frequently agitated and the beaker was covered.
5. The material was soaked into the solvent at room temperature for three to four days.
6. The leaf extract was filtered out with the help of a funnel and filter paper and the ethanolic fluid extract was obtained.
7. The filtrate containing phytochemicals was collected in another beaker.
8. Further, the phytochemicals evaluated of the fluid extract were carried out.

PHYTOCHEMICALS EVALUATION[15,16]

The various phytochemical Evaluation tests were performed which are as follows.

1. Tests for Alkaloids

- **Wagner's test (solution of iodine in potassium iodide)**

In a few ml of filtrate and 1-2 drops of Wagner's reagent; the appearance of a reddish–brown precipitate indicated the presence of alkaloids.

- **Dragondtoff's test (solution of potassium bismuth iodide)**

In a few ml of filtrate 1-2 drops of Dragondtoff's reagent were added; the appearance of a reddish-brown color precipitate indicated the presence of alkaloids.

- **Mayers test (potassium mercuric iodide)**

In a few ml of filtrate 1-2 drops of Myer's reagent were added; the appearance of creamy/yellow precipitate indicated the presence of alkaloids.

- **Hager's test (picric acid)**

In a few ml of filtrate 3-4 drops of 2% picric acid were added; the appearance of yellow color precipitate indicated the presence of alkaloids.

2. Tests for Terpenoids

- **Salkowski test:** In a few ml of plant extract 2 ml chloroform and 3 ml concentrated sulphuric acid. The appearance of a reddish-brown color at the junction of two layers indicated the presence of terpenoids.

3. Test for Tannins

- **Ferric chloride test:** In the alcoholic solution of plant 5% ferric chloride solution was added; the appearance of brownish-green color indicated the presence of tannins.

4. Tests for Flavonoids

- **Lead acetate test:** A few drops of lead acetate solution (10%) were added to the alcoholic extract; the formation of a yellow precipitate indicated the presence of flavonoids.

5. Test for phenolic compounds

- **Ferric chloride test:** A few drops of ferric chloride solution were added to the alcoholic extract; the formation of a blackish-green color indicated the presence of a phenolic compound.

6. Test for glycosides

- **Keller-killing test (cardiac glycosides):** In 1 ml filtrate 1.5 ml glacial acetic acid, 1 drop of 5 % ferric chloride, and conc. Sulphuric acid was added; the appearance of a blue color solution indicated the presence of glycoside.

RESULTS AND DISCUSSIONS

Table 5: Results for test of alkaloids, terpenoids, tannins, flavonoids, phenolic compounds and glycosides.

Species	Test for Alkaloids			
	Wagner 's Test	Dragendroff's Test	Mayer Test	Hager's Test
Curry Leaves	+ve	+ve	+ve	+ve
Indian Bay Leaves	+ve	+ve	+ve	+ve
Mint Leaves	+ve	+ve	+ve	+ve

Species	Test for Terpenoids	Test for Tannins	Test for Flavonoids	Test for Phenolic Compounds	Test for Glycosides
	Salkowski Test	Ferric chloride Test	Lead acetate Test	Ferric chloride test	Keller-killing Test
Curry Leaves	+ve	+ve	+ve	+ve	+ve
Indian Bay Leaves	+ve	+ve	+ve	+ve	+ve
Mint Leaves	+ve	+ve	+ve	+ve	+ve

The curry leaves sample *[Murraya Koeingii]* shows the presence of alkaloids, flavonoids, cardiac glycosides, tannins, phenols, and terpenoids.

- The Indian Bay leaves sample [*Cinnamomum Tamala*] shows the presence of alkaloids, flavonoids, cardiac glycosides, terpenoids, tannins, and phenols.
- The Mint leaves sample [*Mentha Piperita*] Shows the presence of alkaloids, flavonoids, cardiac glycosides, phenols, terpenoids, and tannins.

CONCLUSION

We have studied certain flavor enhancers, their health benefits, and the chemical constituents present in them. We have also performed the phytochemical screening of the extract obtained and we extracted essential oil from the selected samples by using Clevenger apparatus.

The yield of,

1] Curry leaves was 0.048 %.

2] Indian bay leaves were 0.032 %.

3] Mint leaves were 0.034 %.

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REFERENCES

1. https://www.britannica.com/topic/food-additive/Natural-colorants#ref502239/
2. https://www.sciencedirect.com/topics/neuroscience/flavor-enhancers/
3. https://fmtmagazine.in/food-flavours-understanding-food-additives/
4. Vinod.K.P., Chandra.S.S. et al. Health benefits of functional and medicinal properties of some common Indian spices, 2021; page no: 02
5. https://www.healthifyme.com/blog/curry-leaves/
6. Arti Bochare, Shankar Aher, and Dhanashri Jadhav, article of International Journal of Creative Research thoughts on topic A Review on curry leaves, page no 3 to 4.
7. K. Shobana, M.Muthu, B.Pon Sudar Jyothi, et al., article of World Journal of Advanced Research and Reviews on topic " Potential of Murraya koenigii, page no 938 to 940.
8. Shifali. T. W., Gitika. C., Review based upon Ayurvedic and Traditional uses of Cinnamomum Tamala (Tejpatta), 2021; 72-73.
9. Suresh K., Sunil S., Neeru V., Chemical compositions of Cinnamomum Tamala oil from two different regions of India, Asian Pacific Journal of Tropical Disease, 2012; 761-763.
10. https://www.healthbenefitstimes.com/indian-bay-leaf/
11. Naveen K L, Ananya Bhattacharjee, et al., Pharmacological Profile of Mentha piperita, Journal of Pharmaceutical Sciences, 2020; 2-4.
12. https://images.app.goo.gl/wBv7dY2GQKT15KoZA.
13. Zarith Asyikin Abdul Aziz, Akil Ahmad, et.al., Review based on Essential oil, Extraction techniques, pharmaceutical and therapeutic potential, 2018; 19(13): 1100-1110.
14. Kambham Venkateswarlu, Billu Guruprasad, Review based on modern methods of volatile oil extraction.

15. K. Shahira Banu, Dr. L. Cathrine, General Techniques Involved in Phytochemical Analysis, International Journal of Advanced Research in Chemical Science (IJARCS), April 2015; 2(4): 25-28.
16. Junaid R Shaikh and MK Patil, Qualitative tests for preliminary phytochemical Screening: An Overview International Journal of Chemical Studies, 2020; 603-608.