

Phytochemical analysis of some *Ocimum* varieties

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Abstract

The present study focuses on the phytochemical analysis of selected *Ocimum* varieties such as- *Ocimum sanctum*, *Ocimum basilicum* & *Ocimum tenuiflorum*. The genus *Ocimum* (family Lamiaceae) comprises several medicinally important species widely utilized in traditional and modern healthcare systems due to their rich phytochemical composition.

The present study aimed to evaluate and compare the phytochemical profiles of selected *Ocimum* varieties, including *Ocimum sanctum*, *Ocimum basilicum*, and *Ocimum tenuiflorum*. Plant leaf extracts were prepared using suitable solvents and subjected to qualitative phytochemical screening for the detection of major bioactive constituents such as alkaloids, flavonoids, phenolic compounds, tannins, saponins, terpenoids, glycosides, and steroids.

Phenolic compounds and flavonoids were found to be predominant in all varieties, indicating strong antioxidant potential. *Ocimum sanctum* exhibited a higher diversity of secondary metabolites compared to the other species, while *Ocimum basilicum* showed notable concentrations of flavonoids and essential oil constituents.

Keywords: *Ocimum* varieties, phytochemical analysis, medicinal plants, secondary metabolites, flavonoids, phenolic compounds, antioxidant activity

Introduction

Medicinal plants have been used for centuries as a primary source of healthcare due to their therapeutic properties and diverse bioactive compounds. Among these plants, species belonging to the genus *Ocimum* (family Lamiaceae), commonly known as basil, occupy a prominent position in traditional medicine systems worldwide. Various *Ocimum* species, including *Ocimum sanctum* (Holy Basil or Tulsi), *Ocimum basilicum* (Sweet Basil), and *Ocimum tenuiflorum*, are valued for their medicinal, aromatic, nutritional, and industrial applications.

The therapeutic potential of *Ocimum* species is primarily attributed to the presence of a wide range of phytochemicals, such as alkaloids, flavonoids, phenolic compounds, tannins, saponins, terpenoids, glycosides, and essential oils. These secondary metabolites exhibit numerous biological activities, including antioxidant, antimicrobial, anti-inflammatory, antidiabetic, anticancer, and immunomodulatory effects.

Phytochemical analysis is an essential tool for identifying and characterizing bioactive constituents present in medicinal plants. Such investigations provide valuable information regarding the pharmacological potential of plant species and contribute to the development of herbal medicines, nutraceuticals, and pharmaceutical products. Comparative phytochemical studies of different *Ocimum* varieties can help determine variations in metabolite composition and identify species with superior medicinal value.

Although several studies have reported the medicinal properties of individual *Ocimum* species, comprehensive comparative evaluations of different varieties remain limited. Understanding the phytochemical diversity among *Ocimum* varieties is crucial for their effective utilization in traditional medicine, drug development, and commercial cultivation.

Therefore, the present study was undertaken to perform a phytochemical analysis of selected *Ocimum* varieties. The study aims to identify the major phytochemical constituents present in different varieties.

Material and Methods

Material

Fresh leaves & dry leaves of *Moringa oleifera*, *Tribulus terrestris*, *Lagenaria siceraria*, *Lactuca sativa* L, *Vigna unguiculata* (L.) walp

Methods

1. Chlorophylls: Chlorophylls were estimated following the method of Arnon (1949).

Chlorophylls (mg100⁻¹g fresh weight) were calculated using the following formulae

$$\text{Chlorophyll 'a'} = 12.7 \times A_{663} - 2.69 \times A_{645}$$

$$\text{Chlorophyll 'b'} = 22.9 \times A_{645} - 4.68 \times A_{663}$$

$$\text{Total chlorophylls (a+b)} = (8.02 \times A_{663}) + (20.20 \times A_{645})$$

2. Carotenoids: Carotenoids were estimated following the method described by Kirk and Allen, (1965).

$$\text{Total carotenoids} = D \times V.F \times 10 / 2500$$

Where, 2500 = average extinction.

3. Flavonoids: Flavonoids were estimated following the method described by Albert Szent-Gyorgyi (1936–1938), during his research on vitamin C and capillary health.

▪ The total Flavonoids were calculated using the following formula:

$$\text{Total Flavonoids} = RE \times V \times D \times 10^{-6} \times 100/w$$

4. Anthocyanins: Anthocyanins were estimated following the method described by Ludwig Clamour Marquart in 1835.

- The total Anthocyanins were calculated the following formula:

$$\text{Total Anthocyanins} = (A_{532} - 0.24) \times (A_{653})$$

- 5. Proteins:** Proteins were estimated following the method described by Jons Jacob Berzelius in 1838.

- The total protein was calculated the following formula:
Protein conc.=Abs of Sample/ Abs of Std Protein

- 6. Sugars:** Sugar were estimated following the method described by Andreas Sigismund Marggraf in 1747.

- The total protein was calculated the following formula:
Total sugar= Plant abs X Std Abs/ Std Abs

- 7. Ascorbic Acid:** Ascorbic Acid were estimated following the method described by Albert Szent-Gyorgyi in 1928–1932.

- The total Ascorbic acid were calculated the following formula:

$$\text{Total Ascorbic acid} = 0.5/V_1 \times V_2/5 \times 100/\text{weight of sample} \times 100$$

- 8. Free Amino Acids:** Free Amino Acids were estimated the ninhydrin method described by Stanford Moore and William H. Stein in 1948.

- 9. Qualitative Test's:** I performed seven Qualitative Test's they are follow as:

Mayers Test

ii) Phenolic Test

iii) Lead acetate Test

iv) Flavonoids

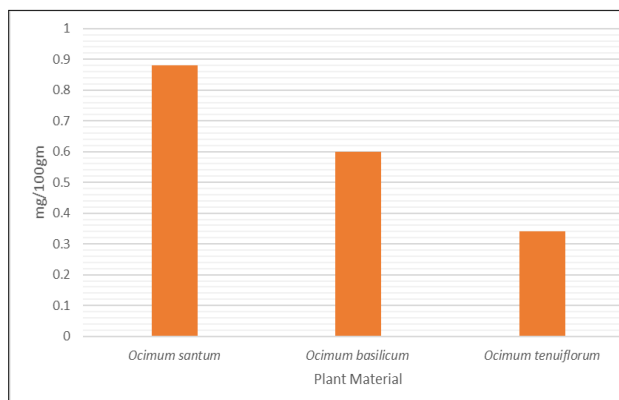
v) Terpenoids

vi) Steroids

vii) Saponins

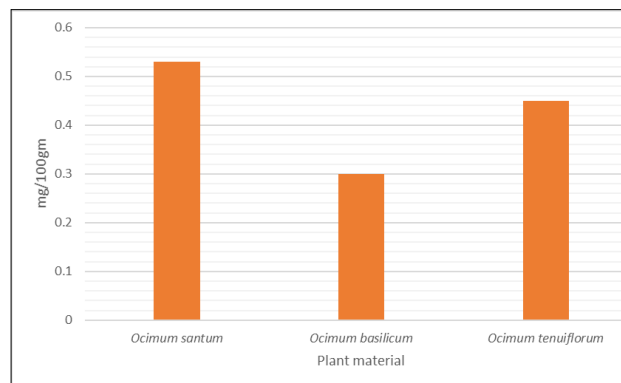
Result and discussion

- 1. Chlorophyll:** The present study found that the Chlorophyll content is higher in *Ocimum tenuiflorum* compared to *Ocimum santum* and *Ocimum basilicum*.

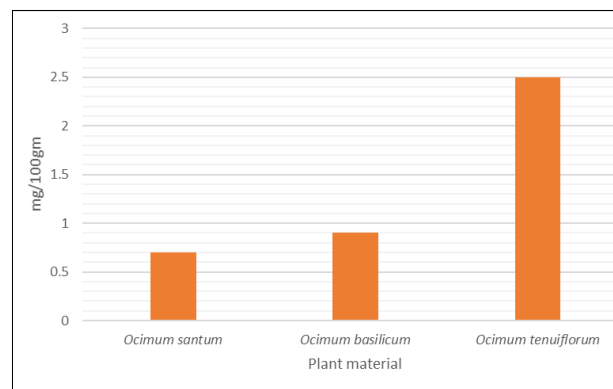


- 2. Carotenoids:** In the current study, the carotenoid content is higher in *Ocimum sanctum* compared to *Ocimum basilicum* and *Ocimum tenuiflorum*.

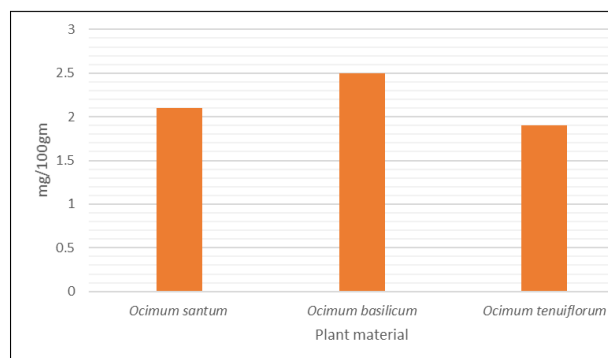
- 3. Flavonoids:** In the present study, the flavonoid content in *Ocimum santum* is higher than that in *Ocimum basilicum* and *Ocimum tenuiflorum*.



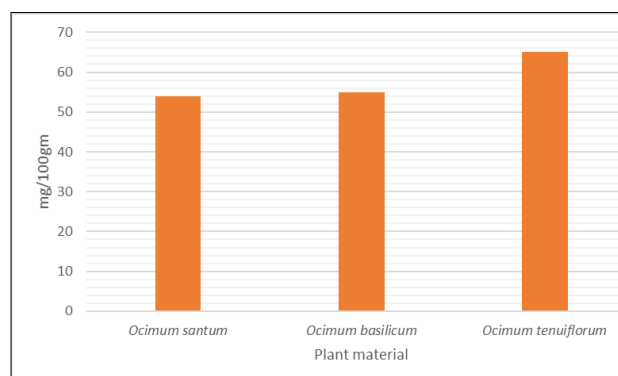
- 4. Anthocyanin:** The present study shows that the anthocyanin content is higher in *Ocimum tenuiflorum* compared to *Ocimum santum* and *Ocimum basilicum*.



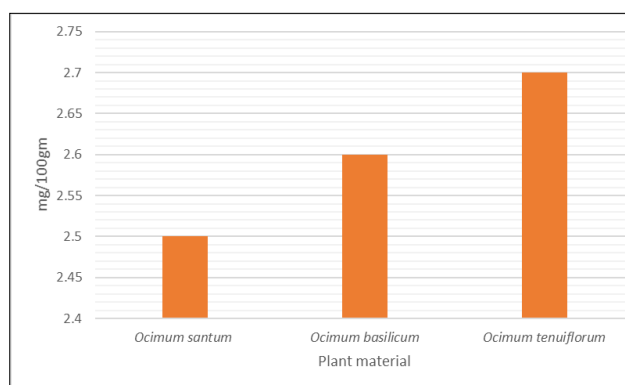
- 5. Protein:** The present study shows that the anthocyanin content is higher in *Ocimum basilicum* compared to *Ocimum santum* and *Ocimum tenuiflorum*.



- 6. Sugar:** In present study Sugar content is more in *Ocimum tenuiflorum* as compare to *Ocimum santum* & *Ocimum basilicum*.



7. **Ascorbic Acid:** In the present study, the Ascorbic Acid content in *Ocimum tenuiflorum* is higher compared to that in *Ocimum santum* and *Ocimum basilicum*.



8. Free Amino Acids:

Amino Acids	Solvent n-butanol: acetic acid: water, 4:1:5(v/v)
Histidine	0.07
Serine	0.10
Lysine	0.10
Arginine	0.11
Aspartic Acid	0.13
Glutamic Acid	0.16
Glycine	0.17
Alanine	0.22
Threonine	0.22
Proline	0.30
Tyrosine	0.32
Methionine	0.40
Valine	0.47
Tryptophan	0.47
Isoleucine	0.55
Phenylalanine	0.58

9. Qualitative Test's:

Sr. No.	Test's	<i>Ocimum santum</i>	<i>Ocimum basilicum</i>	<i>Ocimum tenuiflorum</i>
1	Mayer's Test	+	-	+
2	Phenolic Test	+	+	+
3	Lead acetate test	+	+	+
4	Flavonoid	+	+	+
5	Terpenoid	+	+	+
6	Steroids	+	+	+
7	Saponins	+	+	+

Conclusion

- Various types of *Ocimum*, such as *Ocimum sanctum*, *Ocimum basilicum*, and *Ocimum tenuiflorum* are rich in significant phytochemicals.
- Phytochemicals commonly found include alkaloids, flavonoids, tannins, saponins, phenols, and essential oils.
- Ocimum santum* has greater medicinal value because of its higher number of phytochemicals.
- Ocimum basilicum* possesses a wealth of essential oils, along with a pleasant fragrance and antimicrobial qualities.

- Ocimum tenuiflorum* has similar properties to *Ocimum santum*.
- Some varieties show higher medicinal value because of higher phytochemical content.
- These plants can be used in herbal medicine, food, and pharmaceutical industries.
- Overall, *Ocimum* varieties are rich sources of natural bioactive compounds with health benefits.

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