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A veracious account of *Ocimum gratissimum* L. through pharmacognostic approach

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Abstract- In traditional medicinal practice *Ocimum gratissimum* L. (Ramatulsi) is commonly known as clove-sweet basil, belonging to the family Lamiaceae. The present study deals with the exploration of different pharmacognostic parameters of the plant. The presence of different types of trichomes; oil gland; vessels; stone cells; prismatic crystals of calcium oxalate; cystoliths of calcium carbonate; cork cells, starch grains were observed in the plant powder sample. The extractive values ofleaves, stem, roots and flowers were recorded to be 6.92±0.01%, 7.86±0.01%, 8.125±0.01% and 21.3±0.01% respectively. The ash value content of *Ocimum gratissimum* L., viz., leaf, stem, roots and flowers were recorded to be 9.50±0.01%, 6.45±0.01%, 4.85±0.01% and 7.80±0.01% respectively. The acid insoluble ash value of different plant parts of *Ocimum gratissimum* L., viz., leaves, stem, roots and flowers were recorded to be 2.5±0.01%, 1.4±0.01%, 0.95±0.01% and 2.1±0.01% respectively. The fluorescence analysis showed different colours in different reagents. The significance of this study will find its place in identification, characterization and standardization of the crude drug at species level and would help in exploration of its neutraceutical properties.

Key words: *Ocimum gratissimum*, lamiaceae, medicinal plant, pharmacognosy, organoleptic, extractive value, total ash value, fluorescence analysis

INTRODUCTION

In the era of new scientific research, the focus has been concentrated in discovery and identification of local medicinal plants by its bioactive compounds which are present in the form of essential oil, their characterization, extraction and purification processes and application in drug industries. 25 to 50% of drugs are presently available from secondary metabolites of plants and therefore immense number of aromatic plants is under evaluation.[1] Plant comprehends valuable information in the form of traditional knowledge in medicine that has to be preserved by dint of modern system of treatment.[1] According to WHO, 70% of world population depends on traditional folk medicine to find a treatment against any disease.[2] Recent studies of medicinal plants reveal that even today traditional medication grabs the predominant place in healthcare.[3] About 80% of the world population is dependent on its well-being.[4] *Ocimum gratissimum* is medicinal plant which belongs to the family Lamiaceae and subfamily Nepetoidae. It is native to African continent. According to Ayurveda and Unani medicinal practices, this plant is mentioned for the treatment of several diseases, viz., diarrhea, fever, cough and cold, blood purification, respiratory infections etc.[5] It's an aromatic shrub of about

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0.3- 1 m height, shrubby plant with long petioled leaf and is mentioned in Ayurveda as culninary herb which has broader range of application.[6] The present study was performed to investigate the taxonomic and pharmacognostic parameters of the plant which will help in correct identification and standardization of the crude drug.

MATERIAL & METHODS

I. Collection and Identification

The fresh plant material was collected from the locality of Hooghly and was identified by Central National Herbarium, Botanical Survey of India, Kolkata. The voucher specimen (RU/BOT/JK/SG/001) was deposited for preservation in the University Herbarium of Department of Botany, Ranchi University, Ranchi.

II. Microscopic procedure

a. Organoleptic analysis:

The powders were observed for organoleptic evaluation in order to determine its colour, odour and taste.[7-9]

b. Powder analysis:

For pharmacognostical analysis, the plant parts were separately shade dried and was brought to fine dust using grinder. The powder was heated with chloral hydrate and cooled for few hours. Following standard solutions were tested: phloroglucinol/HCl for lignin and 1% iodine solution for starch. Photomicrographs were pre-pared using Axiocam 208 colour Zeiss attached to a light microscope (Zeiss). The drawing prism was fitted on a compound microscope. The observed elements on the slides were drawn on the white A4 sized paper keeping the eye on the eye piece and looking through the fitted prism.[9]

c. Physico-chemical evaluation:

i. **Extractive value:** 5g of the air dried drug , coarsely, powdered was macerated with 100 ml of alcohol of the specified strength in a closed flask for twenty four hours was being frequently shaked during six hours and allowed to stand for eighteen hours. Filtration was done rapidly, taking precautions against loss of solvent, 25 ml of filtrate was evaporated to dryness in a petridish and dried at 105°, to constant weight and was weighed. The percentage of alcohol soluble extractive with reference to the air dried drug was calculated.[8,9]

ii. **Total Ash value content**: 2 to 3 g of the ground drug were accurately weighed and incinerated, in tarred platinum or silica dish maintain 450° temperature, until carbon free, and then cooled and weighed. In this way if the ash can't be carbon freed, then the charred mass is exhausted with hot water and the residue is collected on an ashless filter paper. Then the residue and filter paper is incinerated, filtrate is added, evaporated to dryness, and ignited at a temperature not exceeding 450°. The percentage of total ash with reference to air dried drug was calculated.[9,10]

iii. **Acid insoluble ash:** 25 ml of dilute hydrochloric acid was added to the obtained ash and boiled for few minutes and the insoluble matter was on an ashless filter paper. After being washed with hot water, it was being ignited to constant weight. The percentage of acid- insoluble ash with reference to air dried drug was calculated.[9,10]

iv. **Fluorescence analysis:** The dried powder of the plant parts were sieved through the sieve plate No. 120 and used for fluorescent studies. 1ml of individual solvents was taken in a clean test tube to which 1 pinch of drug powder was added. Likewise, several tubes were made by adding various solvents, like, 1N HCl, 1N HNO_3, 1N H_2SO_4, ammonia, acetic acid, 10% KOH, 10% NaOH, 5% iodine, 5% $FeCl_3$ and methanol.[11,12]

RESULT & DISCUSSION

a. Organoleptic evaluation:

The preliminary evaluation of pharmacognosy is performed by organoleptic analysis. The leaves, stem, roots and flowers showed varied result (Table 1).

Table 1- Showing organoleptic evaluation of different parts of *Ocimum gratissimum* L

Parts	Colour	Odour	Taste	Texture
Leaves	Bottle green	Pungent	Bitter	Coarse
Stem	Golden brown	Pungent	Bitter	Woody
Roots	Light brown	Pungent	Bitter	Woody
Flowers	White	Pungent	Bitter	Coarse

b. Powder Microscopic evaluation:

The powder microscopy showed several important microscopic structures which can be used in identification of plant species. Presence of fragmented spiral vessels, group of prismatic crystals of Ca-oxalate, parenchymatous cells in fragment, covering trichome, aseptate fibres, tracheids, cluster of stone cells, cork cells with vessels, thin-walled parenchyma cells, cork cells with tanniniferous content, elongated lignified parenchyma cells, cells with brown content, oil glands, glandular trichomes, fragments of cork cells with parenchyma cells containing starch grains, and brown content and simple starch grains were noticed.

The camera lucida drawings were done for starch grains, stone cells, prismatic crystals of Ca-oxalate, oil gland, cells with brown tanniniferous content, fragments of xylem vessels with spiral thickening, elongated lignified cork cells, covering trichome, septate pubescent trichome, fragment of xylem vessels with pitted ornamentation, thin-walled hexagonal parenchymatous cells, aseptate unicellular trichome, aseptate fibre.

c. Physico-chemical evaluation

The extractive value, total ash value and acid insoluble ash of different parts of *Ocimum gratissimum* L., viz., leaves, stem, flowers and rootsis represented in table 2. The evaluated parameters serve as a tool to identification of the crude drug which will help in investigation of different medicinal properties of this plant.

Table 2- Showing analysis of extractive value, total ash value and acid insoluble ash value of different parts of *Ocimum gratissimum* L.

Plant Parts	Extractive value (w/w)	Total ash value (w/w)	Acid insoluble ash (w/w)
Leaves	6.92±0.01	9.50±0.01	2.5±0.01
Stem	7.86±0.01	6.45±0.01	1.4±0.01
Roots	8.125±0.01	4.85±0.01	0.95±0.01
Flowers	21.3±0.01	7.80±0.01	2.1±0.01

Fluorescence analysis: The fluorescence analysis of the crude drug showed different colours in different reagents in visible, short wavelength and long wavelength light which served as an identification of any compounds present in the crude drug. It is represented in table 3 to 6.

Table 3- Showing fluorescence analysis of leaves of *Ocimum gratissimum* L.

Powder Treatment	Visible light	UV light at 254 nm	UV light at 365 nm
Dry Powder	Bottle Green	Bluish Green	Bluish Violet
Dry Powder+ 1N HCl	Light Brown	Dusty Green	Mauve
Dry Powder+ 1N HNO_3	Yellowish Brown	Dusty Green	Mauve
Dry Powder+ 1N H_2SO_4	Yellowish Brown	Dusty Green	Mauve
Dry Powder+ 10% KOH	Greenish Yellow	Pale Green	Blackish Purple
Dry Powder+ 10% NaOH	Greenish Brown	Pale Green	Blackish Purple
Dry Powder+ Acetic acid	Yellow	Deep Green	Blackish Purple
Dry Powder+ Ammonia	Yellowish Brown	Deep Green	Blackish Purple
Dry Powder+ Methanol	Parrot Green	Deep Green	Blackish Purple
Dry Powder+ 5% $FeCl_3$	Sunrise Orange	Deep Green	Blackish Purple
Dry Powder+ 5% Iodine	Deep Orangish Yellow	Deep Dusty Green	Blackish Purple

Table 4- Showing fluorescence analysis of stem of *Ocimum gratissimum* L.

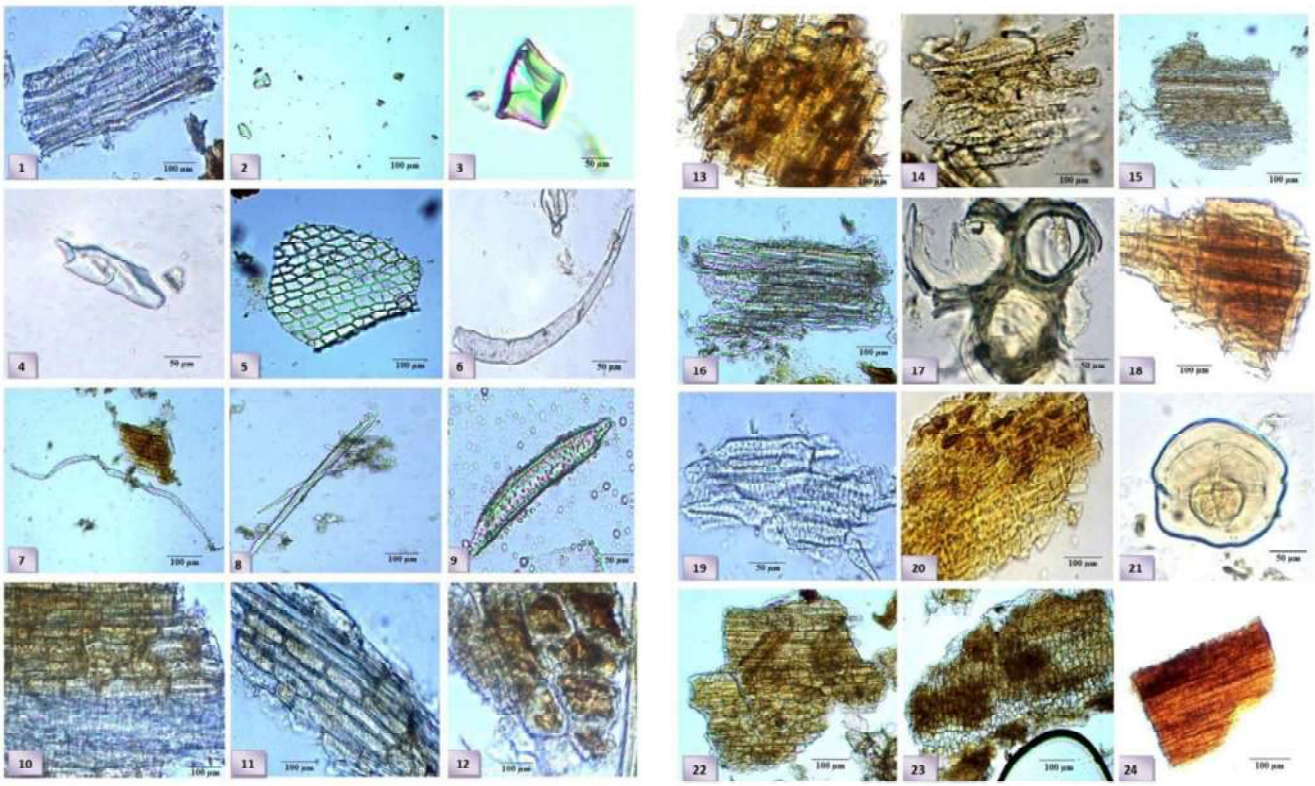
Powder Treatment	Visible light	UV light at 254 nm	UV light at 365 nm
Dry Powder	Brown	Light Blue	Light Blue
Dry Powder+ 1N HCl	Mild Brown	Light Sky Blue	Light Sky Blue
Dry Powder+ 1N HNO_3	Mild Brown	Light Sky Blue	Light Sky Blue
Dry Powder+ 1N H_2SO_4	Mild Brown	Light Sky Blue	Light Sky Blue
Dry Powder+ 10% KOH	Milky Brown	Peacock Blue	Purplish Blue
Dry Powder+ 10% NaOH	Greenish Brown	Peacock Blue	Purple
Dry Powder+ Acetic acid	Yellowish Brown	Light Green	Bluish Grey
Dry Powder+ Ammonia	Yellowish Brown	Peacock Blue	Blackish Blue
Dry Powder+ Methanol	Very Light Yellow	Light Blue	Light violet
Dry Powder+ 5% $FeCl_3$	Mocha Brown	Greenish Blue	Black
Dry Powder+ 5% Iodine	Orangish Yellow	Deep Green	Greenish Black

Table 5- Showing fluorescence analysis of root of *Ocimum gratissimum* L.

Powder Treatment	Visible light	UV light at 254 nm	UV light at 365 nm
Dry Powder	Dark Brown	Sky Blue	Purple
Dry Powder+ 1N HCl	Whitish Brown	Sky Blue	Light Purple
Dry Powder+ 1N HNO_3	Whitish Brown	Sky Blue	Light Purple
Dry Powder+ 1N H_2SO_4	Whitish Brown	Sky Blue	Light Purple
Dry Powder+ 10% KOH	Yellow	Light Green	Greyish Blue
Dry Powder+ 10% NaOH	Orangish Brown	Deep Green	Navy Blue
Dry Powder+ Acetic acid	Light Yellow	Tint Green	Mauve
Dry Powder+ Ammonia	Yellow Ocur	Dirty Green	Ink Blue
Dry Powder+ Methanol	Light Brown	Yellowish Green	Light Purple
Dry Powder+ 5% $FeCl_3$	Deep Yellow	Deep Orangish Green	Deep Purple
Dry Powder+ 5% Iodine	Orangish Yellow	Light Green	Greenish purple

Table 6- Showing fluorescence analysis of flower of *Ocimum gratissimum* L.

Powder Treatment	Visible light	UV light at 254 nm	UV light at 365 nm
Dry Powder	Yellowish Brown	Light Blue	Light Violet
Dry Powder+ 1N HCl	Off White	Light Blue	Light Violet
Dry Powder+ 1N HNO_3	Off White	Light Blue	Light Violet
Dry Powder+ 1N H_2SO_4	Off White	Light Blue	Light Violet
Dry Powder+ 10% KOH	Coffee Brown	Deep Green	Deep Purple
Dry Powder+ 10% NaOH	Orangish Brown	Deep Green	Deep Purple
Dry Powder+ Acetic acid	Light Yellowish Green	Light Green	Light Mauve
Dry Powder+ Ammonia	Yellow occur	Dirty Green	Greyish Purple
Dry Powder+ Methanol	Light Yellowish Green	Light Green	Light Mauve
Dry Powder+ 5% $FeCl_3$	Deep Orangish Yellow	Dusty Green	Bluish Purple
Dry Powder+ 5% Iodine	Light Brown	Deep Green	Bluish Purple



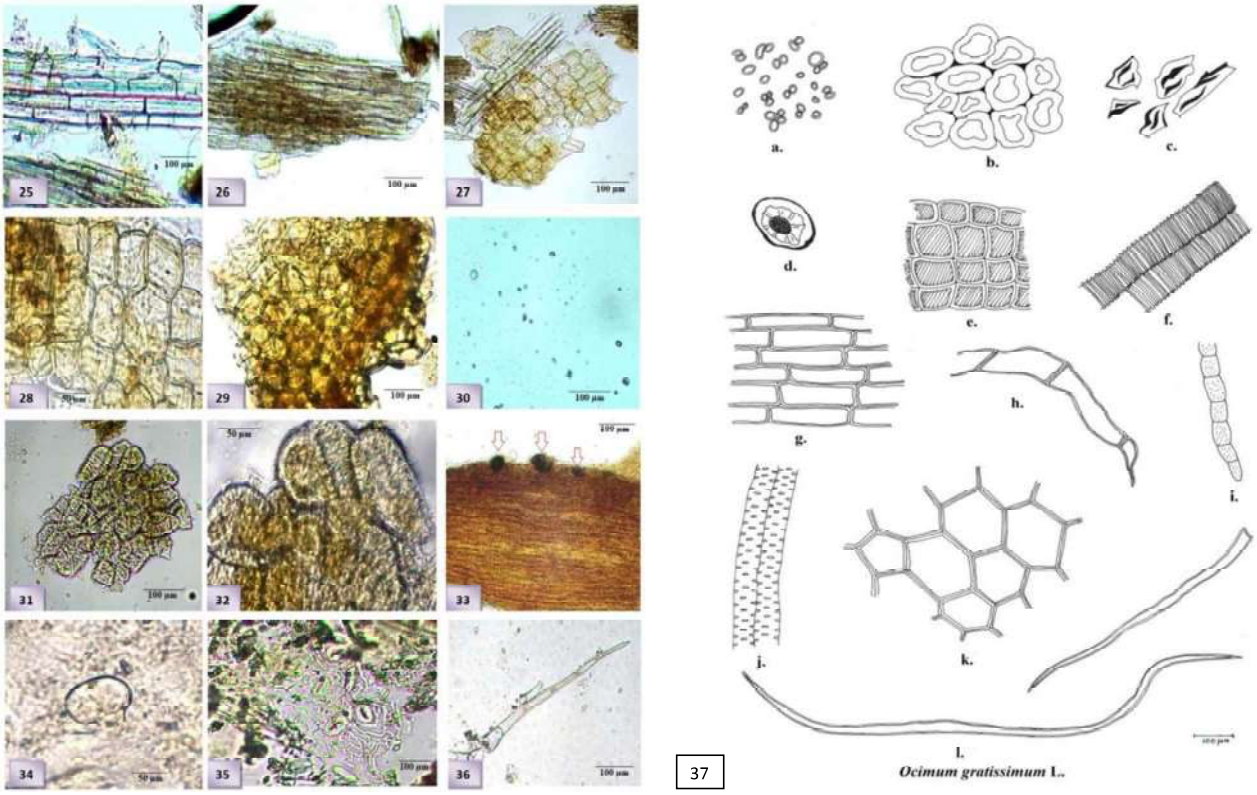


Fig 5: Photomicrographs showing powder study of *Ocimum gratissimum* L.

1	:	Fragments of spiral vessels
2 - 4	:	Prismatic crystals of Ca-oxalate
5	:	Fragment showing thin-walled parenchyma cells
6	:	Trichome
7 & 8	:	Aseptate fibres
9	:	Tracheids
10 & 11	:	Fragment showing stone cells attached to cork cells
12	:	Group of stone cells with lignification
13 & 14	:	Fragments showing group of stone cells
15	:	Fragment showing layers of stone cells attached to vessels and cork cells
16	:	Fragment showing spiral vessels attached to layers of cork cells
17	:	Lignified parenchyma cells
18	:	Oil gland
22 & 23	:	Fragment showing portion of cork cells and parenchyma cells containg starch grains and prismatic crystals of Ca-oxalate in some
24	:	Fragment of cork cells
25 & 26	:	Fragment showing cork cells
27 - 29	:	Fragments showing thin-walled hexagonal parenchyma cells
30	:	Simple and compound starch grains
31 & 32	:	Group of lignifies stone cells of different shaped
33	:	Cystolith
34	:	Glandular trichome
35	:	Fragment showing diacytic stomata attached to irregular shaped parenchyma cells
36	:	Covering trichome
37	:	Camera lucida drawings from the powder drug of *Ocimum gratissimum* L.

CONCLUSION

The present study for evaluation of *Ocimum gratissimum* L. revealed the presence of various characteristic features from the powder evaluation.[10] The physico-chemical characters showed satisfactory results and hence this crude drug can be used in designing drugs related to various bioactivities. The powder drugs failed to permit distinction of overload in the case of ash value content. The fluorescence analysis showed different colors in visible light, short wavelength and long wavelength light which is another characteristic feature of this plant. In respect to these findings, *Ocimum gratissimum* L. can be explored more for its efficient utilization which a part of standardization, identification and research policy.

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