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15. PHARMACOGNOSTIC, EPIDERMAL AND LEAF ARCHITECTURAL STUDIES IN *OCIMUM CANUM* SIMS(LAMIACEAE)

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ABSTRACT

Ocimum canum ,an aromatic medicinal plant,was analyzed for its preliminary pharmacognostic features.it showed presence of bioactive compounds like alkaloids,saponins,phenols and tannins. details of dermatological and leaf –architectural features were studied for its easy identification.

Keywords: Pharmacognostic studies, Epidermis, Leaf Architecture,

Introduction

Ocimum canum is annual herb with great medicinal value. An attempt was made during present investigation to undertake anatomical and pharmacognostic study of this plant for its proper utilization

Materials and Methods

The plant materials were collected from Bamdalwada, near tollnaka at Patoda after rainy season The whole plant was uprooted, cleared from the soil and dust, the leaves, stem, and root were separated and dried in air. The dried material was finely powdered, sieved through muslin cloth and stored for chemical analysis. Few uprooted plants of each species, were preserved in 70% alcohol.

Leaf epidermal studies were carried out on fresh specimens. For which the Peels were stained with safranin (1%) mounted in glycerin and made semipermenant by ringing with DPX solution. Stomatal index (SI) was calculated as defined by Salisbury (1927, 1933), Viz, SI = S/E+S 100. Where 'S' is the number of stomata per unit area, and 'E' is the number of epidermal cells in the area. Stomatal frequency and stomatal index have been expressed as an average of ten reading. Palisade ratios (PR), was calculated as the average of palisade cells (P) beneath each epidermal cell (E) as defined by Zorning and Weiss; (1925), as PR = P/E Small areas of the green tissues outlined by the veinlets are termed as Vein- islets or areoles. The vein- islets number is defined as the number of vein- islet per mm^2 of the leaf surface midway between the midrib and the margins. Levin (1920), determined veinlet number of veinlet number of several dicot leaves. Vein termination number is defined as the number of vein let terminations per mm^2 of the leaf surface midway between the midrib and margin. A vein termination is ultimate free termination of veinlet.

For study of vessels, fragments of plant organs like root and stem were macerated using a mixture of nitric acid (10%) and potassium dichromate (10%) solution in equal proportion. The vessel elements were stained with aqueous safranin (1%), dehydrated and mounted in DPX. Some vessel members were also examined in glycerin.

The line and cellular sketches of the figure were drawn using a camera lucida. The range of length and width of vessel elements was determined by the measurement of 20-25 vessel elements, and were classified as per the classification given by Radford *et. al.* (1974),

Transsection of fresh and preserved materiel of leaf, stem, and root were taken by free hand section. The sections were stained with safranin (1%), light green, (1%), and mounted in DPX after the customary dehydration. Some hand sections were also examined in glycerin Microphotographs of stem and root section were taken by using microphotographic camera

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affixed to Olympus Microscope.

For leaf architecture, leaves were first cleaned by in 10 to 20% aqueous sodium hydroxide solution followed by trichloroacetic acid and phenol solution (2:1 by weight) and then stained with kores stamp pad purple ink (Rao et. al. 1980).

The physiochemical values such as ash, acid insoluble ash, water soluble ash & extractive values were determined following Johannson (1940) phytochemicals studies were done from the shade dried plant parts, following Harborne(1984). The quantitive phytochemicals such as fats[6],alkaloids[9],tannins and phenolics[5] sugars and saponins were estimated following the standard methods.(Sadasivam & Manikam,1992; Chopra & Kanwar,1991; Mukerji 1953)

Result and Discussion

Details of the Anatomical features of *Ocimum canum* has been presented in plates 1&2 The leaf was dorsiventral and amphistomatic . the cells of upper epidermis are longer with thick cuticle.the cells of lower epidermis are smaller .the cuticle is comparatively thin. Stomata are present on both the surfaces. Trichomes are common,papillae are absent , bundle sheath is present. Mesophyll consists of one to two layered palisade tissue and one to three layered spongy tissue. An arc shaped vascular bundle is present in cortex of mid-rib region.The epidermis in midrib region followed by one to two layered collenchymatous hypodermis on both the surfaces followed by parenchymatous cortex.

The epidermal cells are polygonal, isodimetric or elongated in various direction the cell walls may be wavy or sinuous on both the surfaces.The cell walls of abaxial epidermis are more sinuous .the adaxial epidermal cells are with thick walls as compared to the abaxial epidermis. the epidermal cells on veins are generally elongated . the cells in the intercostals region are arranged irregularly are variously oriented.The upper epidermal cells are bigger than the lower epidermal cells a well developed cuticle is present on both the surfaces of leaf and it is smooth

The leaves are amphistomatic The number of stomata per unit area is always higher on the lower surface than the upper epidermis. the stomata are mostly Diacytic.Trichomes are present o adaxial and abaxial surfaces they are present in the intercostal region and on veins. the trichom frequency is more on vein than intercostal region. similarly ,their frequency is more on upp epidermis as compared to lower epidermis. Glandular and Nonglandular trichomes are prese Unicellular,bicellular & uniseriate multicellular type of trichomes are observed. Glandu trichomes may be one celled,two celled or multicelled. the hairs with one celled stalk and one two celled head are present. Sub-sessile glandular trichomes are also present.

The petiole is more or less circular in outline. a longitudinal median groove is pres adaxially.The epidermis consist of small thick walled cells with cuticle. stomata are fe number. Glandular and non-glandular trichomes are common.below epidermis chlorenchymatous patch is seen on both the sides. Epidermis is followed by one to two la collenchyma and is followed by five to six layered parenchymatous cortex. a distinct arc sh vascular strand is present in the centre.Two lateral cortical bundles are present. xylem ele are in linear row . papillae are present on the epidermis.

The node is Uni lacunar one traced.The stem is quadrangular in out line . The epide glandular and non-glandular trichomes are common on the epidermis.

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the T.S. of the stem shows collenchymatous patches in the four angles collenchymatous hypodermis is also present. followed by five to six layered parenchymatous cortex. pericycle is of sclerenchymatous tissue

The T.S.of Root is circular in out line. epidermis is single layered periderm is present cork cambium is followed by several layered cortex. the primary vascular structure is diarch, secondary growth is observed. Phloem is very scanty as compare to secondary xylem. medullary rays are present.

Length of vessel element in root- 144µm to 260 µm Average length-211.6µm Diameter of vessel element-24 µm to 68 µm. Average diameter-51.6 µm to 68 µm.Shape –Napiform,drum like, column like. Latral wall thickening-Simple pitted. Perforation plate –Simple. Pits arrangement- Alternate. Shape of perforation in plates-.oval Circular. Position-Lateral,oblique.tail- short &blunt.

Length of vessel element in stem- 160µm to 568 µm. Average length-402µm. Diameter of vessel element-12 µm to 44 µm. Average diameter- 38.8µm. Shape -Fusiform,drum like, column like. Latral wall thickening Simplepitted.Reticulate, Perforation plate –Simple with scalariform thickening . Pits arrangement- Alternate. Shape of perforation in plates-oval Circular.Triangular. Position-Lateral,oblique. tail- short &blunt.

Leaves are opposite, simple, ovate, elliptical lanceolate, margin serrate, apex acute, base acute; herbaceous, gland dotted, petiolate, lamina symmetrical, primary vein straight venation pinnate. Camptodromous types in the pinnate type.The venation is semicraspidodromous type.

The eragstic substances remain localized in a particular organ or a tissue or remain distributed in the plant body. generally metabolites are found in metabolically active tissues . metabolites like tannin,glycosides,saponin and alkaloids in leaves,stem and root were studied results are given in tabulated form.[Table No-2]

Reactivity of powder of different plant part i.e.leaf,stem,root tested with different reagent powder gave specific colour reaction on the basis of which ,the presence or absence of active chemical compound can be detected.[Table No-3

The Moisture content total chlorophyll content, amount of chlorophyll-a & chlorophyll-b were given in [Table No..4] The physical evaluation i.e. moisture content, total ash ,acid insoluble ash, acid soluble ash, and water soluble and water insoluble ash and extractive values in alcohol and water of the dried leaf, stem and root powder were calculated in terms of air dried sample.ash value gives the amount of inorganic substances present in the drug details of total amount of ash, in the leaf, stem and root were as shown in [Table No-5] the presence of tannins and other phenolic compounds which have antiseptic and anti oxidant properties could explain the use of this plant for the treatment of various diseases.

Total Phenol and Alkaloid content in leaf , stem and root of *Ocimum canum* were recorded in tabulated form[Table No-6.] Total sugar,Reducing & Non reducing sugar content in Leaf, Stem and Root were determined and Recorded in [TableNo-7]

Leaf Constants Table No-1.

	V.T.N	V.I.N	SI	SF	PR
Adaxial Epidermis	22	43	19.17	54	6.0
Abaxial Epidermis	--		24.11	96.4	3.2

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V.T.N:Vein termination number, V.I.N:Vein islet number, SI:Stomatal index, SF:Stomatal frequency, PR:Palisade ratio.

Histochemical analysis.Table No-2

Sr.No	Test	Leaf	Stem	Root
1	Starch	+	+	+
2	Protein	+	+	+
3	Tannin	+	+	+
4	Saponin	+	-	-
5	Fat	+	+	+
6	Glycoside	+	+	+
7	Alkaloid	+	+	+

Effect Of Chemical On Powedered Drug Of *Ocimum canum* Table No-3.

Sr.No.	Reagent	Leaf	Stem	Root
1	Powder	Olive green	Light	Light brown
2	Powder + iodine	Brown	Brown	Light brown
3	Pd+5% Ferric Chloride	Brown	Light brown	Brown
4	Pd + NaoH	Light brown	Light brown	Dark brown
5	Pd + Acetic Acid	Brown	Brownish	Yellow brown
6	Extracts + Acetic acid +50% H2So4	Light brown	Yellow green	Faint Yellow
7	Pd + 50% H2So4	Greenish	Dark green	Green
8	Pd +50% Concentrate HCL	Green	Light Yellow	Green
9	Pd + Ammonia	Light brown	Light Yellow	Light brown
10	Pd + Ammonia + Pot. Ferrocyanide	Light brown	Yellow brown	Light brown
11	Extracts +4% + NaoH+1% CuSo4	Dark brown	Faint brown	Dark yellow
12	Extracts + 4% + NaoH+1% Lead Acetate	Yellowish	Yellowish	Dark Green
13	Pd+50% + Nitric Acid + Picric Acid	Redish brown	Lemon Green	Lemon Yellow
14	Pd+ Saturated picric acid.	Orange brown	Light orange	Dark Yellow

oisture and Chlorophyll content Table No-4.

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Moisture content(%)	52.20
Total Chlorophyll -a mg/gm	1.674
Total Chlorophyll -b mg/gm	1.21
Total Chlorophyll -t mg/gm	2.884

Ash Values & Extractive Values Table No-5

	Leaf	Stem	Root
Total Ash value (%)	4.78	3.20	2.72
ASA (%)	2.36	2.40	0.50
AIA (%)	2.42	0.80	2.00
Total Ash value (%)	4.78	3.20	2.72
WSA (%)	3.73	2.48	2.07
WIA (%)	1.05	0.80	0.65
Alcohol Soluble Extractives (%)	61.20	15.17	20.40
Water Soluble Extractives (%)	50.70	15.16	13.68

Total Phenol Content & Alkaloid Content Table No-6

	Leaf	Stem	Root
Total Phenol Content (%)	0.40	0.30	0.56
Total Alkaloid Content (%)	2.00	1.20	0.60

Sugar Content Table No-7

	Total	Reducing	Non Reducing
Sugar Cont in Leaf	2.30	1.70	0.60
Sugar Cont in Stem	2.00	0.90	1.10
Sugar Cont in Root	2.30	1.50	0.80

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