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# PHARMACOGNOSTIC AND PRELIMINARY PHYTOCHEMICAL SCREENING OF LEAVES OF *GYNANDROPSIS GYNANDRA*.

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## ABSTRACT

*Gynandropsis gynandra* syn. *G. pentaphylla*, (Capparadiaceae) is commonly known as 'Pandharitilvan'. Various parts of the plant are reported as rubefacient, counter-irritant, anthelmintic, in neuralgia, headache and otalgia. Terpenes, β-carotene, sterols, fatty acids, flavonoids, glycosides and alkaloids were reported from various part of plant. Objective of present work is to standardize the leaves by morphology, microscopy, leaf constants and various physical constants. The Morphology, microscopy and leaf constants viz. stomatal number, stomatal index, vein islet number, veinlet termination number and palisade ratio and various physical constants viz. ash values, extractive values and moisture content by loss on drying were performed. Microscopically leaf shows dorsiventral nature, large number of glandular trichomes on both epidermis, vascular bundles were present in 3-5 groups and anomocytic type of stomata are observed. Total ash, acid insoluble ash and water soluble ash were found to be 19% w/w, 2.5% w/w and 5.5% w/w respectively. Water soluble and alcohol soluble extractive values were found to be 15.2% w/w and 7.2% w/w respectively and moisture content was found to be 9.88% w/w. Various leaf constants were found as, stomatal number (upper-9.6-11.4 and lower-15.2-17), Stomatal index (upper- 13.8%-16.41% and lower-25%-26.67%), vein islet number (9-12), vein let termination number (6-8) and palisade ratio (5-6.5).

**KEYWORDS:** *Gynandropsis gynandra*, microscopy, Leaf Constants.

## INTRODUCTION

*Gynandropsis gynandra* Linn (Capparadiaceae) is also known as *G. pentaphylla*.[1,2,3] *G. gynandra* is commonly known as Pandharitilan. It is an erect, rather showy, glandular, pubescent, annual shrub, 1-3 feet high, commonly found in waste places in Tropical Countries and in warmer parts of the India.[1,2,3]

Leaves are 3-5 foliolate, leaflets are sub-sessile, elliptic-obviate, obtuse, acute or acuminate, cuneate at base, pubescent on both sides with sub entire margin. Flowers are white, viscid-pubescent with lanceolate sepals, and seeds are dark brown.[1,2,3]

***Gynandropsis gynandra.***

In Ayurveda, it is reported that roots has a hot sharp taste, removes 'vata', stomachic good in ascites, tumors, ulcers, pain, earache, spleen enlargement and biliary fevers. In Sushruta, it is reported that the leaves are applied externally to boils to prevent the formation of pus. The bruised leaves are rubefacient and vesicant; expressed juice is popular for local application in otolgia, curing earache and sometime curing headache. The pounded leaf is applied as counter- irritant in rheumatism, neuralgia, and headache and in stiff neck. The seeds are anthelmintic and rubefacient and employed internally for expulsion of round worms and externally as counter irritant and in headache.[1,2,3] The *G. gynandra* having immunosupressent[4], anthelmintic[5], antifungal and antimicrobial activity.[6] The aqueous and alcoholic extracts of leaf shows antibacterial activity.[7,8] The plant extract possess potent larvecidal[9] and mosquito repellent activity.[10] The whole plant extract contains different

flavonoids like flavone apegenin 4 and flovonols 1-3, 5, 6. These flavonoids shows prominent anticancer activity against murine P388 lymphocytic leukemia cell lines.[11]

The plant contains glucosinolate Glucocapprin[12], essential oil contains Carvacrol, trans-phytol, linalool, trans-2-methylcyclopentanol, m-cymene, β- caryophyllene, nonalal, 1-α-terpineol, β-cyclocitral, nerol, trans-geraniol, β-ionone, trans-geranylacetone and nerolidol[13], as well as a dammarane triterpenoid mainly Cleogynol.[14] Flowers contains rutin.[15] The seeds contains proteins, lipids, fatty acids-oleic and linoleic acid[16] and 5, 7-dihydroxychromone, 5-hydroxy-3, 7, 4'-trimethoxy flavone and luteolin.[17] The leaves contains Lupeol, β-sitosterol, kaempferol and rutin[18], methyl glucosinolates[19] and β-carotene.[20] The whole plants contains Glucoiberine, glucocapparine, neoglucobrassicin and glucobrassicin.[21]

## MATERIAL AND METHOD

### Authentication

The fresh, plant specimens were collected from Ahmednagar district, of Maharashtra. The plant was authenticated in "Botanical Survey of India, Pune." and a sample voucher specimen of plant was deposited for future reference.

### Macroscopy and microscopy

The Morphology, microscopy and leaf constants viz. stomatal number, stomatal index, vein islet number, veinlet termination number and palisade ratio were performed as per method described. A Fresh leaf of plant was collected and thin transverse section of middle part of leaf was taken, stained with phloroglucinol-HCl, concentrated $H_2SO_4$, Chlor-zinc iodine solution and iodine solution and observed under 10X and 45X. Powder characteristic and surface preparation of leaf was carried out.[22, 23, 24]

### Determination of leaf constants

Stomata, trichomes and epidermal cells are important parameters of leaf constant for evaluation of leaf. These parameters can be studied by exposing the epidermis and studying the type of stomata present, nature of epidermal cell wall, type of trichomes and their details. Apart from these parameters stomatal index, vein islet number, vein termination number which plays an important role in microscopical evaluation of leaf drug. Determination of leaf constants was done.[22, 23, 24]

**Procedure**

Epidermis of leaf was removed with forceps and mounted in chloral hydrate solution. Small pieces of the epidermis were sliced off and placed in a few drops of chloral hydrate solution on a glass slide. The epidermis of leaf was exposed by scrapping off or removing of other tissues. The leaf was placed on a glass slide and tissues were scrapped off with the sharp edge of razor water was slowly continuously added and scrapping was done till transparent and colorless epidermis was exposed which was observed under microscope.[22, 23, 24]

**Determination of various physical constants**

Ash values, water soluble ash, acid-insoluble ash, Water soluble extractives, Alcohol soluble extractives values and determination of moisture content by loss on drying were performed as per following methods.[23, 24]

**I) Determination of ash Value**

Accurately weighed 2- gm of air dried crude drug was taken in a tared silica dish and incinerated at a temperature not exceeding $450^0$C until free from carbon. Cooled and weigt was taken. The percentage of ash was calculated with reference to the air - dried drug.[22, 23, 24]

**II) Determination of water - soluble ash**

The ash obtained was boiled the ash, for 5 minutes with 25 ml of water. Filtered and the insoluble matter was callected in a Grouch crucible, washed with hot water and ignited for 15 minutes at a temperature not exceeding $450^0$C. The weight of the insoluble matter from the weight of the ash was subtracted. The difference in weight represents the water-soluble ash. Percentage of water - soluble ash was calculated with reference to the air - dried drug.[22, 23, 24]

**III) Determination of acid- insoluble ash**

The ash obtained was boiled with 25 ml of 2M hydrochloric acid for 5 minutes. Filtered and the insoluble matter was collected in a Gooch crucible washed with hot water, ignited, cooled in a desiccator and weighed. The percentage of acid soluble and acid - insoluble ash was calculated with reference to the air - dried drug.[22, 23, 24]

**IV) Determination of extractive value[22, 23, 24, 25]**

**i. Determination of water-soluble extractive value**

5 g of coarsely powdered air-dried drug was macerated, with 100 ml of Chloroform water of the specified strength in a closed flask for 24 hours. It was shaked frequently during the first

6 hours and allowed to stand 18 hours and filtered rapidly taking precautions against loss of water, 25 ml of the filtrate was evaporated to dryness in a tared flat-bottomed shallow dish, dried at $105^0$C and weighed. The percentage of water-soluble extractive value was calculated with reference to the air-dried drug.

**ii. Determination of alcohol-soluble extractive value**

5 g of coarsely powdered air-dried drug was macerated, with 100 ml of 95% ethanol in a closed flask for 24 hours. It was shaked frequently during the first 6 hours and allowed to stand for 18 hours and filtered rapidly taking precautions against loss of ethanol, 25 ml of the filtrate was evaporated to dryness in a tared flat-bottomed shallow dish, dried at $105^0$C and weighed. The percentage of ethanol-soluble extractive value was calculated with reference to the air-dried drug.

**V) Determination of Loss on Drying**[22, 23, 24, 25]

Weighed glass-stoppered shallow weighing bottle dried under the same conditions to be employed in the determination of loss on drying. 2g of sample was transferred to the weighing bottle and weigh the bottle with cover was taken. The sample was distributed evenly to a depth not exceeding 10mm. The loaded bottle was placed in the oven and the stopper was removed. The sample was dried to constant weight. After drying it was cooled to room temperature in a desiccator and weighed. Loss on Drying was calculated in terms of percent w/w.

## RESULTS AND DISCUSSIONS

**I. Macroscopy**

Colour :- Greenish

Odour :- Characteristic

Size: - 3-5 foliolate with sub sessile leaflets

Shape: Elliptic, obovate.

**II. Microscopy**

**A) Transverse section**

**a) Lamina**

**Upper epidermis**- Showed presence of single layered, straight walled rectangular cell, with distinct cuticle, glandular trichomes, few anomocytic stomata.

**b) Mesophyll-** Showed palisade cells single layered, compact and readially elongated, and spongy parenchyma 4-6 layered, loosely arranged with intracellular spaces.

**Lower epidermis**- Showed presence of single layered, straight walled rectangular cell, with distinct cuticle, glandular trichomes and anomocytic stomata.

**Glandular trichomes**: Stalk with 2-3 or 4 layers of cellulosic cells and non lignified head.

**Stomata**: Anomocytic type of stomata.

**c) Midrib: - Epidermis:** In this the epidermal cells are continuous with midrib region and showed the presence of glandular trichomes.

**Collenchyma:** Thick walled cellulosic cells, double layered above lower epidermis and single layered below upper epidermis, rest of midrib is filled with parenchyma.

**Vascular bundles**: are oval shaped collateral, 3-5 groups Xylem is lignified while Phloem is non- lignified.

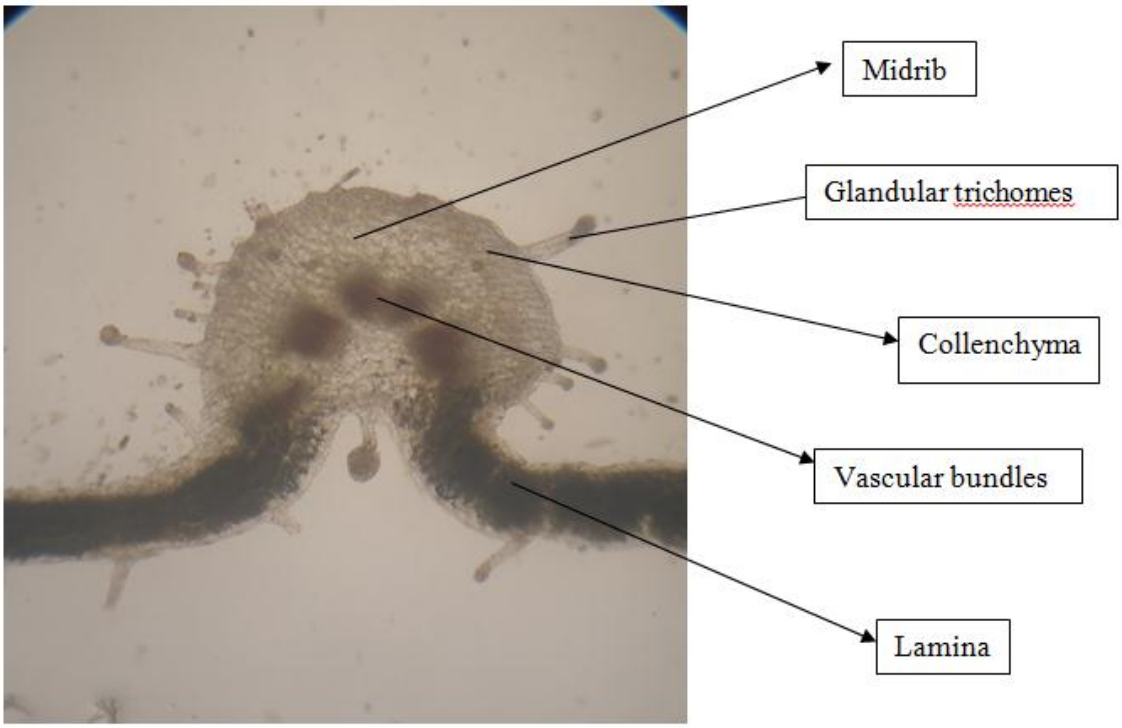



**Fig. 1. Transverse section of *G. gynandra.***

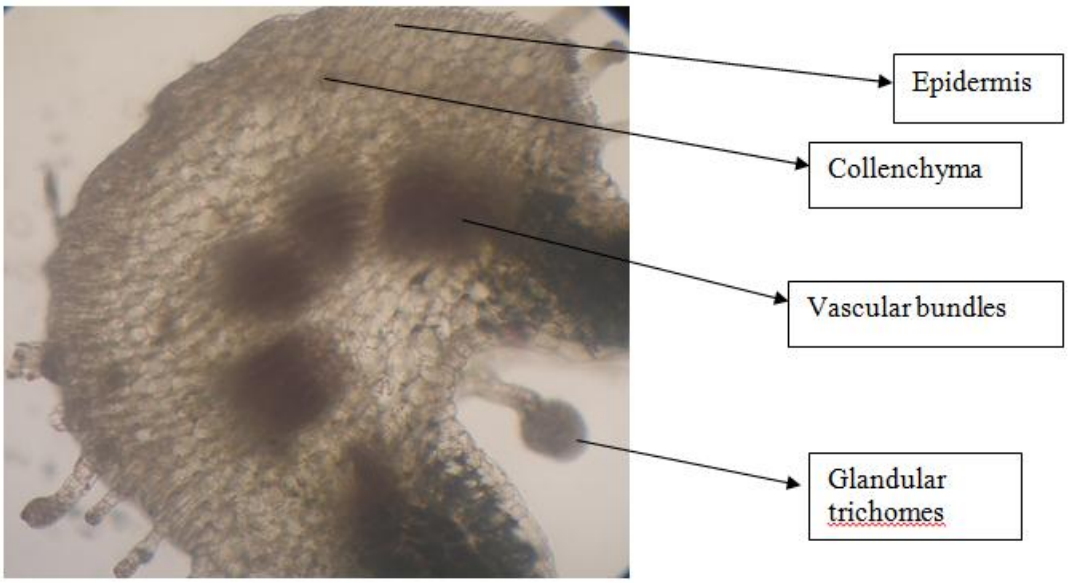
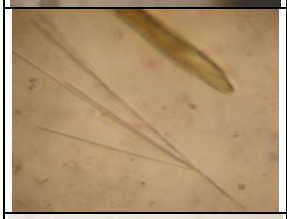
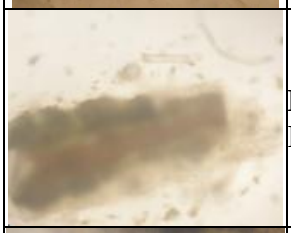
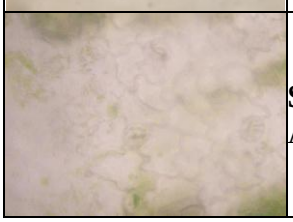



**Fig. 2. Transverse section of Midrib of *G. gynandra.***

**Powder Drug Characteristics**

Calcium oxalate crystals, Lignified cells, glandular Trichomes, Anomocytic type of stomata.

| | |
|---|---|
|  | **Starch grains**<br>Very abundant, present in parenchymatous cells. |
|  | **Calcium oxalate crystals**<br>Ca-oxalate crystals very abundant, occurs as needles and cluster crystals |
|  | **Lignified cells**<br>Lignified cells with spongy parenchyma present in xylem. |
|  | **Trichomes**<br>Multicellular large in numbers with 2-3 or large layers of cellulosic cells and non-lignified head. |
|  | **Stomata**<br>Anomocytic type of stomata was present in large amount. |

### III. Determination of leaf constants

The leaf constants were determined and their values are as follows:

| Sr. No. | Name of evaluation | Value |
|---|---|---|
| 1 | Stomatal number. (upper surface) | 9.6 - 11.4 |
| 2 | Stomatal number. (lower surface) | 15.2 - 17 |
| 3 | Stomatal index. (upper surface) | 13.8%-16.41% |
| 4 | Stomatal index. (lower surface) | 25% - 26.67% |
| 5 | vein islet number | 9-12 |
| 6 | vein termination number | 6-8 |
| 7 | palisade ratio | 5 - 6.5. |
| 8 | Water soluble extractives | 15.2%w/w |
| 9 | Alcohol soluble extractives | 7.2%w/w |
| 10 | Loss on Drying | 9.877%w/w |
| 11 | Total Ash Value | 19%w/w |
| 12 | Water Soluble Ash Value | 5.5%w/w |

## CONCLUSION

The complete pharmacognostic, microscopic and physical evaluation of the plant *G. gynandra* leaves will help the future researchers for isolation and characterization studies.

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