

PHARMACOGNOSTIC STUDIES OF *ADHATODA VASICA* NEES, AND ITS IMPORTANCE AS A SOURCE OF RAW MATERIAL FOR THE PHARMACEUTICAL INDUSTRIES OF PAKISTAN

by

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and

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Introduction

Adhatoda vasica Nees, belong to the family Acanthaceae. It is an evergreen gregarious shrub 48-96 cm in height with a fetid smell. The plants are commonly distributed in Karachi, Sind, North Waziristan, Khyber and Kurram Agencies, Dir, Chitral, Swat, Lower Hazara, Rawalpindi and Jhelum district upto an elevation of 1200 meters (3).

The plant is much valued for its powerful expectorant and anti-spasmodic properties. Leaves are used in asthma, chronic bronchitis and all kinds of coughs. The powdered leaves are used in malarial fevers, dysentery and diarrhoea. The boiled leaves infusion is useful for tuberculosis and rheumatic joints (1).

Adhatoda vasica locally known as Berg-e-Bansa is extensively used in Unani and Ayurvedic systems of medicines from time immemorial. Recent survey carried out by the Medicinal Plant Branch, Pakistan Forest Institute Peshawar has revealed that large quantities of this drug can be collected easily from the above mentioned areas. The seeds are a good source of an essential oil, which constitutes about 22 per cent of the total weight. Pharmacognostic studies were carried out on *Adhatoda vasica* plants in order to identify, evaluate the distinguishing macroscopical and microscopical characters of the crude drug. Results achieved during this study are presented in this paper.

Material and Method

Adhatoda vasica leaves were collected from the foot hill of Murree and Rawalpindi districts in the month of May at the time of flowering of the plants. The leaves were cleaned

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and dried in shade and later on the material was preserved in formaline solution. The dried material was studied and physical characters i.e. shape, size, scars, colour, smell, taste, fracture and sound of breakage were noted. The powdered drug was prepared by grinding the leaves and sieving the material through mesh No. 22. For histological studies the sections were cut with the help of rotary microtome and permanent slides were prepared according to the procedure given in the book "Plant microtechnique" (2).

Results

Macroscopic characters. Crude drug consists of dried crumpled leaves which on crushing emits a fetid smell. Entire leaves have a length of 6-11 cm and a breadth of 2-5 cm. On crushing, the drug breaks in different shaped fragments. The dorsal side of the dried drug is green where as the ventral surface is light green in colour. On the ventral surface the midrib is quite conspicuous and bulging. The venation is unicostate and alternate.

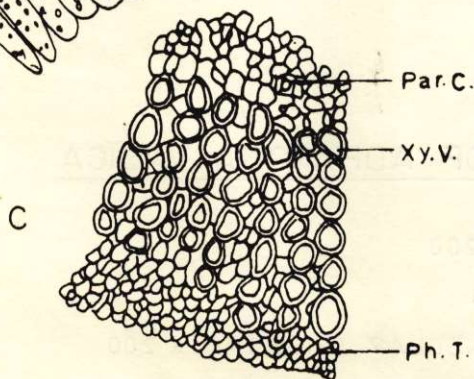
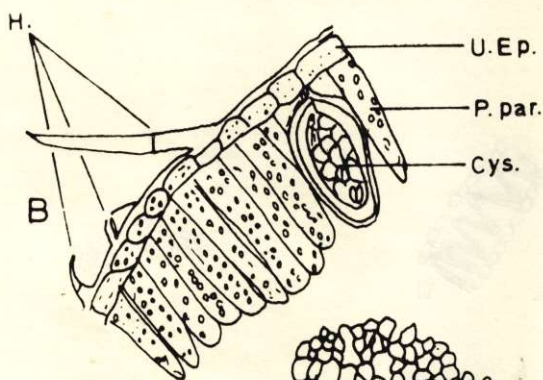
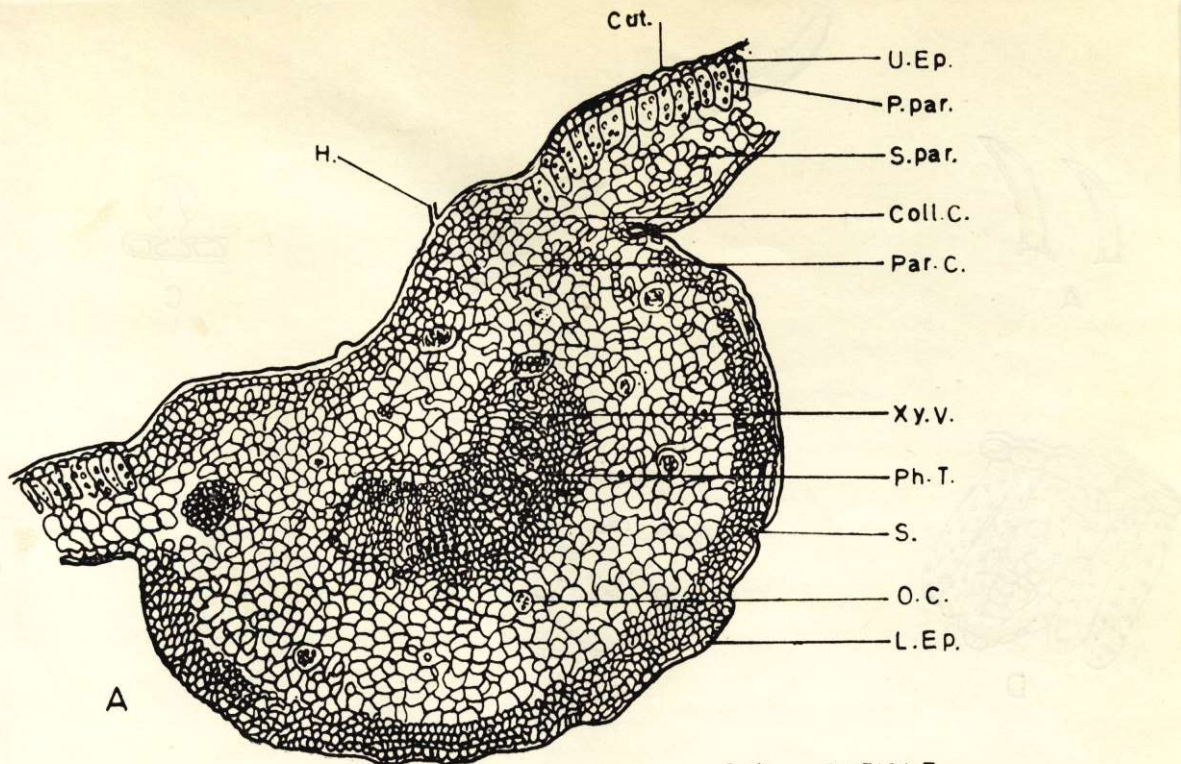
Microscopic characters

Transverse section of the leaf shows that the epidermis consists of single layer of parenchymatous cells with wavy anticlinal walls covered with cuticles and interrupted by caryophyllaceous stomata. Numerous unicellular hairs from 100-200 microns in length and 10-20 microns in breadth and many uniseriate 2-3 celled hairs from 170-270 microns in length and 10-25 microns in breadth arise from the epidermis. Small sessile quadricellular glandular trichomes are also present on the epidermis.

Mesophyll is differentiated into palisade and spongy parenchyma lying between the upper and lower epidermi. The palisade parenchyma lies just beneath the upper epidermis and certain of its cells contain cylindrical cystoliths. The spongy parenchyma lies below the palisade parenchyma in 3-4 loosely arranged layers having numerous intercellular spaces. Between the lower and upper epidermi in the region of midrib lie 4-5 layers of collenchymatous cells. Collenchyma encloses parenchymatous cells which bear small intercellular spaces. Certain parenchymatous cells are oil cells. Midrib of leaf lamina shows vascular bundles consisting of xylem and phloem, the former one towards the upper surface and the later towards the lower surface. Lower epidermis is similar to upper epidermis with the difference that stomata are more in number than in the upper epidermis.

Powdered Drug

Powdered drug is grassy green in colour, tasteless and with a fetid smell. Microscopic study of the powdered drug shows fragments of epidermis with caryophyllaceous stomata, unicellular, uniseriate and quadricellular glandular trichomes. Fragments of palisade parenchyma with cylindrical cystoliths, parenchyma, pieces of annular, spiral and reticulate vessels are present in the powder.

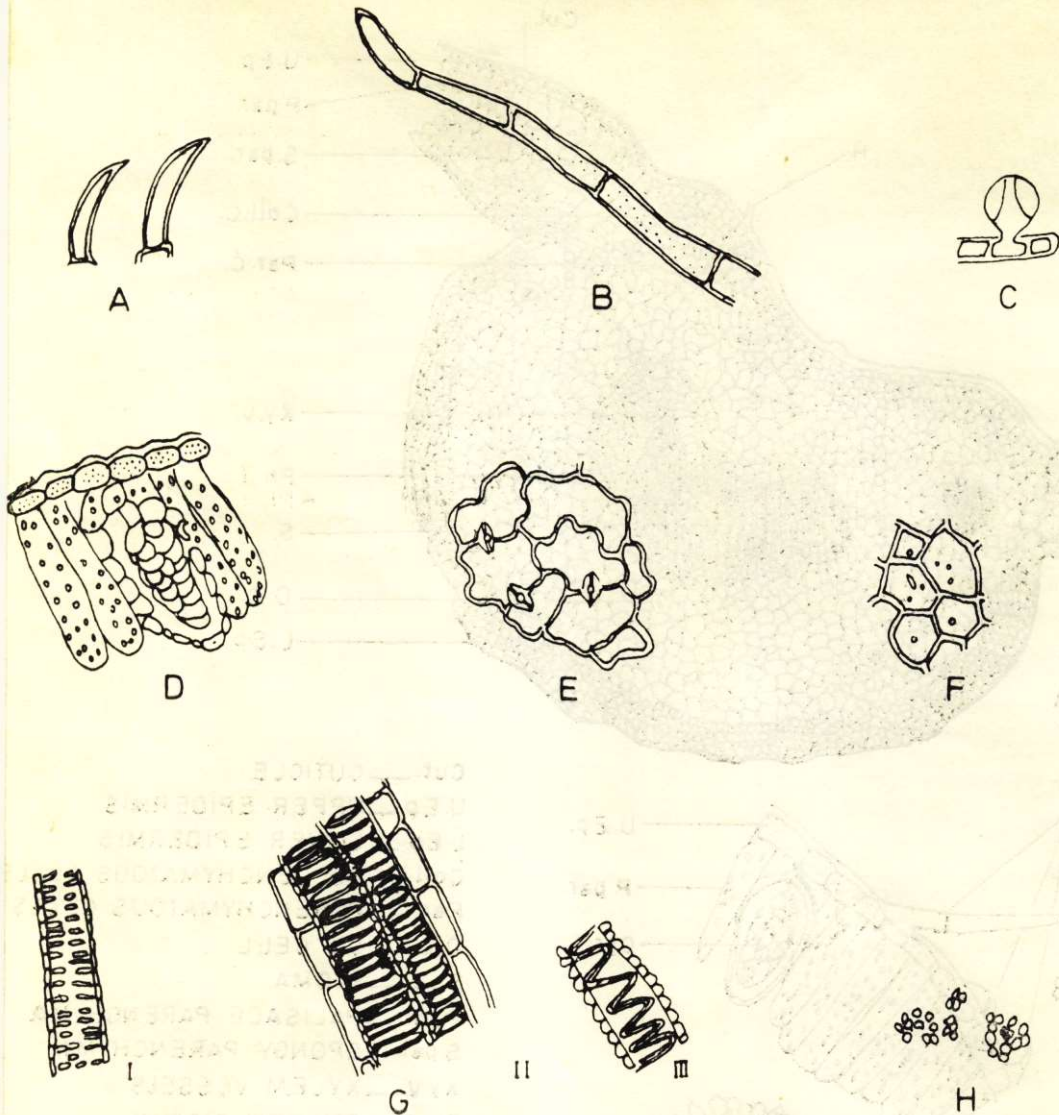


Cut. — CUTICLE
 U.Ep. — UPPER EPIDERMIS
 L.Ep. — LOWER EPIDERMIS
 Coll.C. — COLLENCHYMATOUS CELL
 Par.C. — PARENCHYMATOUS CELLS
 O.C. — OIL CELL
 S. — STOMA
 P.par. — PALISADE PARENCHYMA
 S.par. — SPONGY PARENCHYMA
 Xy.V. — XYLEM VESSELS
 Ph.T. — PHLOEM TISSUE
 H. — HAIR
 Cys. — CYSTOLITH

ADHATODA VASICA LEAF

A. TRANSVERSE SECTION OF LEAF X 40

B. A PORTION OF TRANSVERSE SECTION OF LEAF X 150



POWDERED DRUG OF ADHATODA VASICA

- A. UNICELLULAR HAIR X 200
- B. UNISERiate HAIR X 150
- C. QUADRICELLULAR GLANDULAR TRICHOME X 200
- D. PALISADE PARENCHYMA WITH CYSTOLITH X 200
- E. EPIDERMIS WITH CARYOPHYLLACEOUS STOMATA X 200
- F. PARENCHYMATOUS CELLS X 200
- G. I. RETICULATE VESSEL, II ANNULAR VESSELS WITH XYLEM PARENCHYMA, III SPIRAL VESSEL X 200
- H. STARCH GRAINS X 200

Constituents

The leaves contain very small amount of an essential oil, a crystalline acid and a white crystalline alkaloid, vasicine $C_{11}H_{13}N_2O$. The alkaloidal content of the leaves is 0.2-0.4%(1).

Suggestions

At present only one firm Ferozsons Limited is preparing glanical preparation from *Adhatoda vasica* plants. The quantity of crude drug being utilized is very nominal though millions of Kg of crude drugs can be made available to the pharmaceutical firms as a raw-material. *Adhatoda vasica* is a well known remedy for chest effections and rheumatic joint's. The crude drug is also utilized by some of the Unani pharmaceutical firms and it has lot of scope if efforts are made to prepare medicine from *Adhatoda vasica* for export purposes to the countries where Unani or Ayurvedic system of medicine is followed to some extent. There is a dire necessity for large scale exploitation of this natural resource of Pakistan.

Acknowledgements

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