Pharmacognosy of a local market sample of Parpataka *Mollugo cerviana* (L.) Ser.

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**ABSTRACT**

Parpataka is an important Ayurvedic drug used for the treatment of fevers particularly. The local market sample of Parpataka is identified as *Mollugo cerviana* (L.) Ser. The botanical, macroscopical, microscopical characters of root, stem, leaf, whole plant macerate, powder analysis, histochemical tests, physical constants and fluorescence studies are presented.

**Keywords:** *Mollugo cerviana*, macroscopical, microscopical characters, powder microscopy studies, physical constants, fluorescence studies.

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**INTRODUCTION**

The identity and pharmacognosy of a locally sold crude drug in the name of Parpataka has been shown as *Mollugo cerviana* (L.) Ser. and the distinguishing characters of the same with *Fumaria indica* (Hassk.) pug.

Parpataka is an important Ayurvedic drug used in the Indian systems of medicine. The whole plant possesses medicinal properties¹⁻². The drug is diuretic, anthelmintic, digestive and relieves constipation. It is bitter, cooling and constrictor. It is used in the treatment of Rakta pitta (haemorrhage), Trishna (Thirst), Brama (giddiness) and Daaha (burning sensation)³⁰. In spite of its manifold uses, the drug remains controversial because several plants are used and sold under the name Parpataka in different parts of the country.


During a market survey of crude drugs, it was observed that a drug locally known as Parpatakamu (Telugu) was used as Parpataka in the Ayurveda and in the Siddha preparations of South India. On a critical study, it was found that this plant was a totally different from the above mentioned taxa. Hence, it became necessary to identify this market sample of the drug botanically. Further, since the botanically identified plant *M. cerviana* has been accepted by a majority of Ayurvedic physicians as the true Parpataka as mentioned in the Ayurvedic classics, the distinguishing characters between *Mollugo cerviana* and *F. indica* was thought necessary and they are also presented.

Samples of *M. cerviana* known as Parpatakamu crude drug were obtained from the crude drug dealers of Tirupati market and also from the crude drug stores of the Srinivasa Ayurvedic Pharmacy, Tirupati, where this is used as Parpataka in Ayurvedic preparations.

**Identification**

Since the drug Parpatakamu happens to be a regional name, a literary survey was made to find out if the name has been used for other botanically identified plants. A plant under the name *Mollugo cerviana* and in tamil called as Parpadagam ¹⁰. A check with the local Vaidhyas revealed that the same plant is known as Parpatakamu in Telugu also. This gave a clue on its identification. Hence, it was concluded that the market sample of the drug under the name Parpadagam which has been used as Parpataka, belongs to family Molluginaceae. In siddha
system whole plant promotes antipyretic and astringent activity.\(^7\)

The Herbarium specimen was collected by author (205) on 14\(^{th}\) November 2006 in the Panapakam Forest guest House area, Chittoor district, Andhra Pradesh and it is authenticated\(^8\) and deposited in the Herbarium of the Sri Venkateswara University, Tirupati, Andhra Pradesh.

**MATERIALS AND METHODS**

The plant material was collected from Tirupati, Andhra Pradesh. The voucher herbarium specimen was processed followed by standard procedures\(^9\), macro- and microscopical studies\(^10\-11\), phytochemical studies, fluorescence analysis and powder analysis were carried out\(^12\-15\).

**Taxonomy**


**External Morphology**

Annual glabrous herb grows up to 12 cm tall, branchlets glaucous, in whorls of 8 from the root stock. Radical leaves rosulate, narrow 0.5-1 cm long, cauline leaves 5-7 in a whorl at nodes, narrowly linear or acicular, 1-1.5 cm long 0.2 cm, width, sessile or subsessile, glaucous below, base attenuate, margin entire, apex obtuse, petiole upto 1 cm. Flowers white in terminal and axillary polychasial umbellate cymes. Peduncle slender 1.5 cm, bract subulate 0.5 mm, pedicel upto 5 mm. Flowers 2.5 mm across, sepals 5, subequal, elliptic, 1-5.2 mm, obtuse. Stamens 5-8, filaments 1 mm. Ovary 3-lobed, styles 3, upto 0.2 mm (Plate1).

**RESULTS**

**Root**

*Macroscopical Characters*

Roots are long, lateral roots few, outer zone is not peelable, slightly bitter to taste.

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Plate 1: *Mollugo cerviana* (L.) ser. Entire plant
Pharmacognosy of a local market sample of Parpataka
Microscopical Characters

Transverse section of the thin root is 350 μm in diameter and has no growth rings. Transverse section of the thick root is 800 μm in diameter and has a distinct growth rings. The epidermis of the root is broken and disintegrated. The cortex is narrow comprising of 4-5 layers of Parenchyma cells. Secondary xylem is solid, dense and uniformly circular. It consists of wide, thick walled vessels. In thicker roots, distinct growth ring and semiringporous vessels are present. The xylem fibres are thick walled and lignified. The vessels include both narrow (15 μm) and wide elements (30 μm). Secondary phloem is made up of 4 layers of cells (Fig. 1.1-3).

Stem

Macroscopical Characters

Stems are filiform very slender, terete, brown coloured and intermodes are elongated, branchlets glacous, in whorls of 7-8 from the root stock. Slightly bitter to taste, no specific smell, stem is not peelable, with 0.5 mm thickness.

Microscopical Characters

Transverse section of the stem is 420 μm in diameter, consists of a single layer of spindle shaped, thick walled epidermal cells with thick cuticle. A single layer of hypodermal cells are present beneath the epidermis, these cells are similar with epidermal cells. The epidermal and hypodermal layers are 10-15 μm thick. The cortex is made up of 4-5 layers of sclerenchymatous cells with highly thickened lignified walls measuring about 40 μm thick.

The vascular bundles are arranged in the form of a ring around pith. It comprising of a ring of large, compact, metaxylem elements and one or two protoxylem elements at certain loci of the metaxylem ring. Phloem elements are seen along the outer surface of the metaxylem elements, central pith cavity is surrounded by 3 layers of parenchymatous cells (Fig. 2-1.2).

Leaf

Macroscopical Characters

The leaf is fairly thick, radical leaves rosulate, narrow 0.5-1 cm long, cauline leaves 5-7 in a whorl at nodes, narrowly linear or acicular, 1-1.5 cm length, 0.2 cm width, smell pleasing and no specific taste.

Microscopical Characters

Transverse section of the leaf shows uneven surface and less prominent midrib. The upper and lower epidermal cells are 50 μm thick, some of the epidermal cells are mucilaginous and the mucilage oozes out as clouds from the epidermis. The mesophyll consists of 3 to 4 layers of wide, thin walled compactly arranged parenchyma cells (Fig. 3.1.2).

The midrib is not prominent, it is slightly bulged on the lower side and flat on the upper side. The vascular bundle of the midrib consists of two small discrete xylem strands and few phloem elements, vascular bundle is surrounded by a layer of bundle sheath cells, and outer to the hyaline sheath cells a layer of radially oblong cells containing chloroplasts are present.

Whole plant-Macerate: Whole plant maceration shows the following elements.

Fibres (Fig. 4.1):

Mostly narrow, long and cylindrical with thick walls and narrow lumen. Pits not evident up to 950 μm long and 15 μm wide.
**Vessel elements (Fig. 4.2):**

Long, narrow, cylindrical, perforation plate simple and oblique. Lateral wall pits circular, alternate. Vessel elements tailless or shortly tailed up to 250 μm long and 30 μm wide.

**Epidermal cells (Fig. 5.1):**

Cells large, amoeboid in shape, walls wavy thick and smooth.

**Seed (Fig. 5.2):**

Semicircular seeds with smooth seadcoat, embryo curved and horse – shoe shaped. Seed size 450 × 500 μm wide.

**Seed Coat (Fig. 5.3):**

Cells of the seed coat elongated, polyhedral, thick walled, cells arranged in longitudinal parallel rows. Outer cell layer consists of vertically oblong palisade cells.

**Powder microscopy**

In the powdered preparation, leaf epidermal peeling and seeds were observed. The adaxial epidermis in surface view has highly lobed cells, their anticlinal walls are thick and much undulate. Entire seeds were also visible in the powder; the seeds are flat on one side and hemispherical on the other side. The seed is 450 μm in horizontal plane, the surface of the seed is smooth and even (Fig.6).

**Histochemical Tests**

The sections were treated with different reagents and the observations are provided in Table-1.
Anti-Inflammatory Activity of Leaves of Argyreia Nervosa

Figure 4:1–2: Whole plant macerate
VE – Vessel element; Fi – Fibres;
PP – Perforation plate
Legends – Fig. 3, 4
(AbE – Abaxial epidermis; BS – Bundle sheath; M – Mucilage; MT – Mesophyll tissue; Ph – Phloem; VB – Vascular bundle; X – Xylem; AdE – Adaxial epidermal; S – Seeds).
Pharmacognosy of local market sample of Parpataka Mollugo cerviana (L.) Ser.

Powder Analysis

The powder is pale green in color. It has been no characteristic odour and slightly bitter to taste. The results are given in table-2.

DISCUSSION

M. cerviana can be distinguished morphologically from F. indica in being small herbs, branchlets glaucous, roots are slightly bitter to taste and microscopically wider zone of secondary xylem, growth ring and thick walled xylem fibres, stems are slender, filiform, slightly bitter to taste, presence of thick walled epidermal cells and cortex is made up of 3-4 layered scherenchymatous tissue. The central part is occupied by pith cavity. Leaves narrow or

Figure 5. Mollugo cerviana
Whole plant macerate
1. Epidermal Cells in surface view
2. One seed with curved embryo
3. Seed coat cells enlarged
Legends – Fig. 5.
(EC – Epidermal cells; EM – Embryo; SC – Seed coat).
Pharmacognosy of a local market sample of Parpataka Mollugo cerviana (L.) Ser.
linear and microscopically shows mucilaginous epidermal cells, mesophyll is made up of 3-4 layers of thin walled compactly arranged parenchymatous cells, vascular bundle is surrounded by a layer of radially oblong cells containing chloroplasts.

### Table 1: Histochemical Tests

<table>
<thead>
<tr>
<th>Drug</th>
<th>Reagents</th>
<th>Test for</th>
<th>Reaction</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section</td>
<td>Iodine solution</td>
<td>Starch</td>
<td>Blue colour</td>
<td>+</td>
</tr>
<tr>
<td>Section</td>
<td>Ferric chloride solution</td>
<td>Tannin</td>
<td>Black</td>
<td>+</td>
</tr>
<tr>
<td>Section</td>
<td>Sudan III solution</td>
<td>Oil globules</td>
<td>No effervescence</td>
<td>-</td>
</tr>
<tr>
<td>Section</td>
<td>Phloroglucinol + dil. HCl</td>
<td>Lignin</td>
<td>Magenta</td>
<td>+</td>
</tr>
<tr>
<td>Section</td>
<td>Conc. HCl</td>
<td>Crystals</td>
<td>No effervescence</td>
<td>-</td>
</tr>
</tbody>
</table>

+ = Present; - = Absent

### Table 2:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder treated with water</td>
<td>Non-sticky</td>
</tr>
<tr>
<td>Powder shaken with water</td>
<td>Foam like froth</td>
</tr>
<tr>
<td>Powder treated with 5% aqueous NaOH sulphuric acid</td>
<td>Brown</td>
</tr>
<tr>
<td>Powder treated with 60% aqueous sulphuric acid</td>
<td>Brown</td>
</tr>
<tr>
<td>Powder pressed between filter paper for 24 hours</td>
<td>No oil stain</td>
</tr>
</tbody>
</table>

### A) Physical constants. The results are given Table-3.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ash (%)</td>
<td>9.775</td>
</tr>
<tr>
<td>Water soluble ash (%)</td>
<td>2.195</td>
</tr>
<tr>
<td>Alkalinity of water soluble ash (ml)</td>
<td>1.46</td>
</tr>
<tr>
<td>Acid insoluble ash (%)</td>
<td>1.415</td>
</tr>
<tr>
<td>Extract values(%)</td>
<td></td>
</tr>
<tr>
<td>Alcohol soluble extract (% w/w)</td>
<td>2.141</td>
</tr>
<tr>
<td>Water soluble extract (% w/w)</td>
<td>4.10</td>
</tr>
<tr>
<td>Hexane soluble extract (% w/w)</td>
<td>0.66</td>
</tr>
<tr>
<td>Chloroform soluble extract (% w/w)</td>
<td>0.28</td>
</tr>
</tbody>
</table>

### CONCLUSION

The South Indian Ayurvedic drug market sample of the Parpataka is evaluated for its identification, botanical, macro-, microscopic details of root, stem, leaf, whole plant macerate, powder microscopy, powder analysis, histochemical tests, physical constants and fluorescence studies of the drug identified as the M. cerviana (L.) Ser. it is not only used in Ayurvedic preparations but also used in the preparations of Siddha System of Medicine\textsuperscript{14}.

### ACKNOWLEDGEMENTS

Our sincere thanks are due to the Regional Botanist, Botanical survey of India, Coimbatore for lending authentic herbarium specimens and the Director, PARC, Chennai for providing the necessary facilities to carry out this work.
B) Fluorescence Studies. The results are given in Table-4.

<table>
<thead>
<tr>
<th>Experiments</th>
<th>Visible / Day light</th>
<th>UV Light 254 nm</th>
<th>UV Light 365 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug powder</td>
<td>Pale green</td>
<td>Green</td>
<td>Brown</td>
</tr>
<tr>
<td>Drug powder + 1 N NaOH (aq.)</td>
<td>Brown</td>
<td>Green</td>
<td>Pale yellow</td>
</tr>
<tr>
<td>Drug powder + 1 N NaOH (alc.)</td>
<td>Brown</td>
<td>Yellowish green</td>
<td>Pale yellow</td>
</tr>
<tr>
<td>Drug powder + 1 N HCl</td>
<td>Brown</td>
<td>Pale green</td>
<td>Black</td>
</tr>
<tr>
<td>Drug powder + 50% $H_2SO_4$</td>
<td>Reddish brown</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>Drug powder + 50% $HNO_3$</td>
<td>Orange</td>
<td>Fluorescent green</td>
<td>Black</td>
</tr>
<tr>
<td>Drug powder + Picric acid</td>
<td>Dark olive (green)</td>
<td>Fluorescent green</td>
<td>Pale green</td>
</tr>
<tr>
<td>Drug powder + Acetic acid</td>
<td>Brown</td>
<td>Pale green</td>
<td>Black</td>
</tr>
<tr>
<td>Drug powder + Ferric chloride</td>
<td>Dark olive (green)</td>
<td>Pale green</td>
<td>Black</td>
</tr>
<tr>
<td>Drug powder + $HNO_3 + NH_3$</td>
<td>Reddish orange precipitate</td>
<td>Yellowish green</td>
<td>Green</td>
</tr>
</tbody>
</table>

REFERENCES