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Pharmacognostical and physico-chemical studies on the leaf of *Mollugo Pentaphylla* L

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ABSTRACT

Mollugo pentaphylla is an important medicinal plant which belongs to family Aizoaceae, used traditionally in the treatment of stomachic, aperient, antiseptic, emmenagogue and poultices for sore legs. An infusion of the plant is given to women to promote the menstrual discharge. Leaves are bitter and antiperiodic, they are warmed after smearing with oil and applied to the ear to relieve earache. The present study provides taxonomical, pharmacognostical and physico-chemical details helpful in laying down standardization and pharmacopoeial parameters. The important parameters studied are microscopical study, behaviour of powdered materials, histochemical studies, behavior of powder with different chemical reagent & fluorescence analysis. Physico-chemical studies revealed total moisture content (10.5%), total ash (15.83 %), watersoluble ash (6.5%), acid insoluble ash (5.5%), sulphated ash (23%), ethanol extractive (7.8%) and water extractive (14.8%).

Key words: microscopical character, physico-chemical analysis, inorganic element analysis, fluorescence analysis, *Mollugo pentaphylla*

INTRODUCTION

Herbal drugs are being proved as effective as synthetic drugs with lesser side effects. Herbal medicines are in line with nature, with less hazardous reactions. *Mollugo pentaphylla* Linn. (family- Aizoaceae) is commonly known as carpet weed (English), Pita-gohun (Oriya). It is an erect slender, much branched annual herb, up to 30 cm. high, commonly found in dry as well as moist areas. Leaves are falsely whorled or opposite, linear-lanceolate to obovate. Flowers are white, greenish, orange or pink, in terminal compound cymes. Capsules are globose with many dark reddish brown seeds. Roots are creaper and adventitious¹. The plant contains carotene, traces of vitamin C, saponin and potassium nitrate. It is also having numerous applications in traditional medicine as stomachic, aperient, antiseptic, emmenagogue and is also used in poultices for sore legs. An infusion of the plant is given to women to promote the menstrual discharge. Leaves are bitter and antiperiodic, they are warmed after smearing with oil and applied to the ear to relieve earache². It has been reported that the plant possesses antimicrobial³, whooping cough⁴, hepatitis⁵, spermicidal⁶, anti-inflammatory, anticancer and hepatoprotective⁷. The present study was evaluated for the pharmacognostical and physico-chemical study of aerial part of *Mollugo pentaphylla* L.

MATERIALS AND METHODS

Pharmacognostical evaluations like microscopical studies are carried out by taking free hand sections. The section were stained with safranin and fast green [8,9,10] Powdered materials of root part were cleared with NaOH and mounted in glycerin medium after staining different cell component were studied and measured. Photographs of different magnifications were taken with Sony digital camera. For normal observation bright field was used. Powder of the dried leaf was used for microscopical study, physico-chemical studies, behaviour of powder drug towards different chemical reagent, fluorescence analysis were carried out [11,12,13,14,15,16].

RESULTS AND DISCUSSION

Microscopic character

Transverse section of lamina of leaf

Epidermis is single layer and consists of rectangular parenchymatous cell. Epidermal layer is followed by 4-5 layer of sclerenchymatous cell. The cells are thick and lignified. It is present above and below the midrib. Three groups of vascular bundles are present in the mid rib region. Xylem vessels is surrounded by the xylem parenchyma. The group of vascular bundles are surrounded by parenchymatous cells. Rosette crystals are found in few parenchymatous cells.

Powder Microscopy Of Leaf

The diagnostic characters are

Epidermis- The walls of the epidermal cells are wavy and light brown.

Vessels- Fragments of xylem vessels are very wide and show bordered pits.

Stomata- Fragments of stomata are found.

Fibre- Well developed sclerenchymatous fibres from the vascular bundles are found.

Pollen grains- These small sized, spherical and about 2-3 groups.

Crystals- Prism of calcium oxalate crystals are found. Cluster crystal as big as 100 microns in diameter with well defined and pointed corners.

Starch granules- These are simple and compound with 2-6 / more components. These are spherical 16.66 μ to 33.32 μ .

Physico-Chemical Analysis

Ash values

The total ash, water soluble ash, acid insoluble ash and sulphated ash of leaf were found to be 15.83w/w, 6.5%w/w, 5.5%w/w & 23%w/w (Table-1). Acid insoluble ash was found to be less than total ash, water soluble ash and sulphated ash. Sulphated ash was found to more than total ash, acid insoluble ash and water soluble ash. Ash value is a measure of the quality and purity of the drug.

Total extractive values

The extractive values were determined to find out the amount of soluble compounds. The ethanol and water extractive values of leaf were found to be 7.8w/w and 14.8%w/w. The leaf showed more amount of water soluble component than ethanol soluble components (Table-1).

Loss on drying

The moisture content of leaf 10.5 w/w which was shown in (Table-1).

Behaviour of powdered materials towards some chemical reagents

The behaviour of the powdered leaf were treated with Picric acid, conc.sulphuric acid, con.hydrochloric acid, con.nitric acid, glacial acetic acid, 5% ferric chloride, sodium hydroxide (5N), potassium hydroxide (5%), Iodine/20 solution were observed and the results are present in (Table-2).

Fluorescence analysis

Fluorescence analysis of entire leaf has been carried out in daylight and under U.V light. The powders were treated with different organic solvents and solutions were again observed in normal daylight and under U.V. light and the observations are pooled in (Table-3).

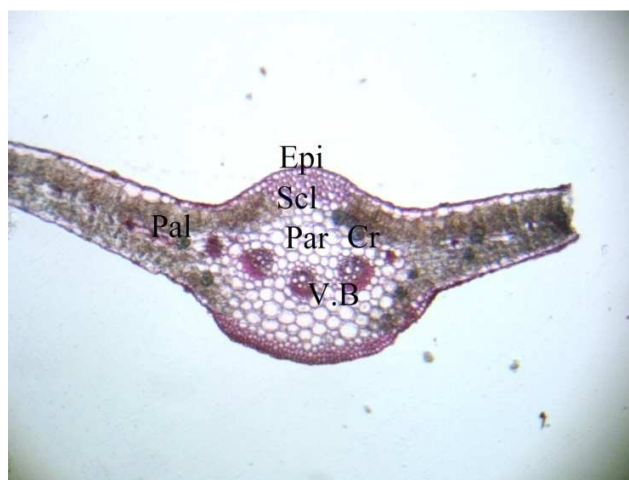


Fig-1

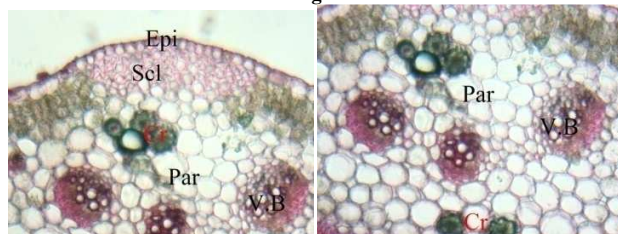


Fig-1(a)

Fig-1(b)

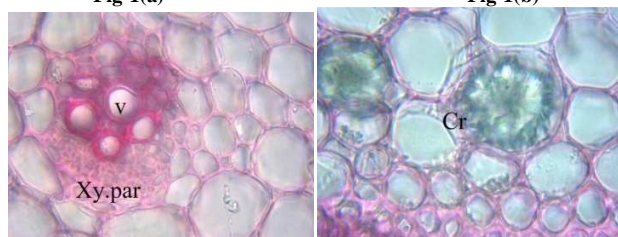


Fig-1(c)

Fig-1(d)

Fig-1-T.s of leaf

Fig-1(a,b)-Enlarge portion of leaf.

Fig-1(c)-Enlarge portion shows vessels, and xylem parenchyma.

Fig-1(d)-Enlarge portion shows presence of crystals.

*Epi-Epidermis, Scl-Sclerenchymatous cell, Pal-Palisade cell, Par-Parenchymatous cell, Cr-Crystal, V-Vessels
Xy.par-Xylem parenchyma*

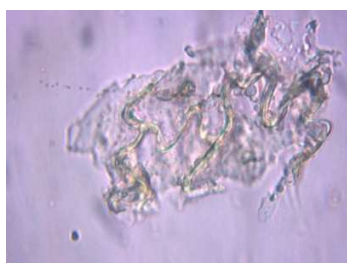


Fig-a

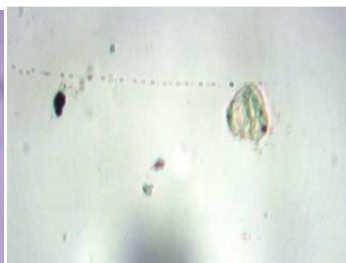
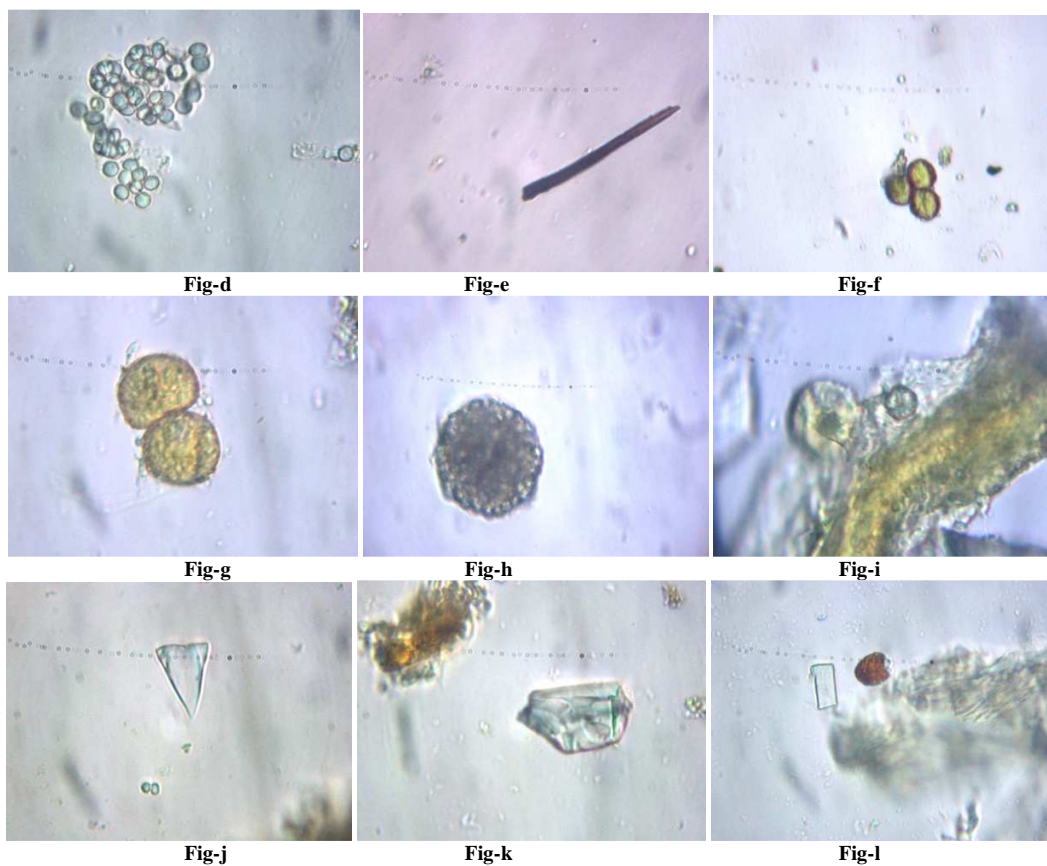


Fig-b



Fig-c

**Fig-a:** Epidermis in surface view.**Fig-b:** Fragments of stomata.**Fig-c:** Vessel with pitted wall.**Fig-d:** Starch granules.**Fig-e:** Lignified fibres.**Fig- f & g :** Pollengrains.**Fig-h & i:**Cluster crystal.**Fig-j, k & l:** Prismatic crystals.**Table-1** Physico-chemical analysis

Tests	Results (% W/W)
Moisture content	10.5
Ash values	
Total ash	15.83
Water soluble ash	6.5
Acid insoluble ash	5.5
Sulphated ash	23
Extractive value	
Ethanol	7.8 w/w
Water	14.8 w/w

Table-2 Behaviour of leaf powder with different chemical reagents

SL.No	Acid/Reagent	Observation
1	Powder as such	Dull green
2	Powder + Picric acid	Yellow
3	Powder + Con.Nitric acid	Orange
4	Powder + Con.HCL	Green
5	Powder + Con.H ₂ SO ₄	Reddish brown
6	Powder + Glacial acetic acid	Green
7	Powder + 5% FeCl ₃	Light green
8	Powder + NaOH(5N)	Light green
9	Powder + KOH (5%)	Yellowish green
10	Powder + Iodine/20	Yellowish brown

Table-3 Fluorescence analysis of the root powder

SL.No	Reagent	Day light	Short wave
1	Powder as such	Dull green	Green
2	Powder + 1N NaOH in methanol	Yellowish green	Deep green
3	Powder + 1N NaOH	Greenish yellow	Deep green
4	Powder + Ethanol	Faint green	Dull green
5	Powder + HNO ₃ +NH ₃ solution	Yellow	Green
6	Powder + 50% HNO ₃	Yellowish brown	Green
7	Powder + 1N HCL	Watery	Light green
8	Powder + HCL	Watery	Green
9	Powder + H ₂ SO ₄	Brownish black	Deep green
10	Powder + 50% H ₂ SO ₄	Dull green	Dull green
11	Powder + Glacial acetic acid	Light green	Light green
12	Powder + HNO ₃	Yellowish orange	Yellowish green

CONCLUSION

The present work focuses on the pharmacognostical and physico-chemical investigation of aerial part of *Mollugo pentaphylla*. The pharmacognostical characters and physic-chemical studies help in the identification of the drugs and also in laying down pharmacopeial standards.

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