Pharmacognostical studies on Cyanotis fasciculata var., Fasciculata

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ABSTRACT

Cyanotis fasciculata Var., Fasciculata (commelinaceae) is a small, terrestrial, annual herb, commonly found on dry grass lands & rocks. The literature survey coupled with phytochemical and pharmacological screening of the herb has revealed its therapeutic potential. As the microscopic-botanical diagnosis is an indispensable parameter in modern monograph, the present communication deals with microscopic literature survey coupled with phytochemical and pharmacological screening of the herb has revealed its therapeutic potential. As the Cyanotis fasciculata (Commelinaceae) is a small, terrestrial, annual herb of 4-10 inches long at branches, commonly found on dry grass lands and rocks. Flowers blue, purple or pink in colour and are present in auxiliary or terminal position with 3 petals united into a tube below. Stems are slender, slight pinkish, with cottony cob webby appearance. Leaves are broadly ovate to narrowly linear usually obtuse, juicy, woolly Cob- Webby.

The juice from succulent leaves used to treat skin fungus disease and mouth sores. The hydroalcoholic extract of entire plant is reported to be useful in lymphatic leukemia, possess diuretic and antiviral properties.

As such so far pharmacognostical studies have not been reported for this under-exploited plant, hence the investigation was undertaken to establish the detailed microscopy of leaf, stem and root along with most befitting descriptive terminology including quantitative microscopic parameters. In addition, various ash and extractive values are also documented. This could serve as a measure of authentication of this crude drug.

MATERIALS AND METHODS

The plants were collected from Fort hill- top of Bellary, Karnataka in the month of October and were authenticated by Dr. Kotresh, Department of Botany, Karnataka University, Dharwad, Karnataka to preserve the delicate structures of succulent leaves & slender stems. After infusing the specimen with paraffin wax, the embedded blocks were subjected to transverse sections using microtome. The selected sections were carefully dewaxed as per procedure and stained with toluidine blue. Microphotographs of the sections were made using Nickon Lab Photo 2 Microscopic unit.

Physicochemical analysis

The physical constant like moisture content of air dried powder sample was detected by loss on drying method. Different ash values and various extractive values were determined as per the I.P. procedure (1996). The powder was exhaustively extracted with petroleum ether, alcohol (95%) and water by soxhlation; extracts were dried in rotary vacuum evaporator and relevant yields were calculated; stored in airtight containers at 4°C.

Preliminary phytochemical studies

The individual extracts were subjected to qualitative chemical investigation for the identification of various phytochemical constituents as per standard procedure.

RESULTS

Pharmacognostical studies

Leaf: The leaf is spindle shaped in cross sectional view; it exhibits typical hydromorphic anatomical features. It has wide, vertically oblong, rectangular, single horizontal row of aqueous chambers separated by their undulate vertical filaments.

The adaxial epidermis is wider, comprising of large, dilated, thick walled, rectangular to barrel shaped cells. The abaxial epidermis is wide with rectangular to squarish thin walled cells; there are about three layers of fairly wide parenchymatous cells. Above this zone, there is a dense, dark band of compact palisade cells underlining the aqueous chambers.

The vascular bundles are situated in between parenchyma & palisade zone; it is collateral with 2-3 xylem elements & small nest of phloem elements. This set is surrounded by single layer of dilated bundle sheath of parenchyma cells (Fig. 1).
Table 1. Quantitative Microscopy of Leaves Of *Cyanotis fasciculata*

<table>
<thead>
<tr>
<th>Particulars (Quantitative microscopy of leaves)</th>
<th>Upper Epidermis</th>
<th>Lower Epidermis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stomatal Number</td>
<td>NIL</td>
<td>800 – 1100</td>
</tr>
<tr>
<td>Stomatal Index</td>
<td>NIL</td>
<td>19.5 – 24.5</td>
</tr>
<tr>
<td>Vein islet number</td>
<td>8 – 11</td>
<td></td>
</tr>
<tr>
<td>Vein termination number</td>
<td>7 – 11</td>
<td></td>
</tr>
<tr>
<td>Palisade Ratio</td>
<td>3.25 – 3.50</td>
<td>NIL</td>
</tr>
</tbody>
</table>

Fig. 1: T.S. of leaf - AdE; Adaxial surface, Pa; Partition filament, Ac; Aqueous chamber, PM; palisade mesophil, AbE; abaxial epidermis

Fig. 3: T.S. of root - Co-cortex, Mx-Metaxylem, Ph-Phloem, Px-Protoxylem, Rh - Rhizodermis.

Fig. 4: Staminal filaments showing monoliform beads

Fig. 5: Magnified image of Seed showing concave disc with a beak

Fig. 6: The typical monocotyledonous stomata on the lower epidermis surrounded by four hexagonal cells in cruciate arrangement

Fig. 2 & 2.1: T.S. of the stem- CB-Central bundle, C0-Cortex, EP-Epidermis, GT-Ground tissue Hd-Hypodermis, OB-outer bundle, Ph-phloem, Sc-sclerenchyma, PVC-Peripheral vascular cylinder, X-xylem.
**Stem:** The stem is circular and even and is 2–3.5mm in diameter. It consists an epidermal layer, narrow cortex, outer ring of vascular cylinder and central free vascular strands.

Epidermis is uniformly thickened; comprising of spindle shaped or squarish cells with thick walls, the cells are 30μm thick. The cortical zone is 170μm wide; the sub epidermal layer of cortical cells has thick walls and is radially oblong. The sub epidermal layer is 40μm thick. The remaining cortical tissue consists of thin walled, circular, compact Purenchyma cells.

The vascular system consists of an outer ring of about 10–12 small collateral bundles interconnected by sclerenchyma cells. The outer vascular cylinder is 100–150μm thick. The vascular strands have one or two metaxylem elements with phloem situated in between the metaxylem elements.

The central vascular system consists of 6-8 vascular strands forming a ring with a single central strand. The vascular strand has 4 or 5, wide, circular metaxylem elements and two or three protoxylem elements (Fig 2, 2.1).

**Roots:** Roots of more than 600μm thickness has distinct rhizodermal layer, aerenchymatous cortex and a central stele. The rhizodermal layer has rectangular wide cells. The cortex has one or two layers of smaller compact sub-epidermal cells; the minor cortex has a ring of wide squarish air chambers. The stele has four central metaxylem elements and 7-8 protoxylem strands. Phloem occurs along different radial lines in between the protoxylem. (Fig 3).

**Quantitative microscopy:** As a part of quantitative microscopy stomatal number, stomatal index, vein islet, vein termination number and palisade ratio were determined by using fresh leaves of the plant are as shown in Table 1.

**Physicochemical parameters:** C. fasciculata powder showed the presence of total ash - 18.17%w/w, water soluble ash - 3.85%w/w, acid insoluble ash - 3.81%w/w, pH Value - 7.60, specific gravity - 1.01, moisture content - 7.46%w/w, volatile mater found nil, water-soluble extractive - 13.41%w/w, alcohol-extractive - 8.31%w/w and petroleum ether - soluble extractive – 4.36%w/w.

**Preliminary phytochemical studies:** The qualitative chemical tests indicated the presence of phytosterols in petroleum ether extract; alkaloids and traces of glycosides were found in chloroform extract; aqueous extract showed the presence of tannins, saponins and vitamin C. Where as alcoholic extract (95%) showed the presence of all these phytoconstituents in addition to flavonoids and coumarins.

**DISCUSSION**

Leaves broadly ovate to narrowly linear, Succulent, lanceolate, alternate, simple, parallel–veined, sessile and silky cob webby; 2-5 cm long, 0.6 – 0.8 cm wide & 0.12 – 0.16 cm thick in the middle position.

Upon microscopy leaf revealed dorsi–ventral with hydro-morphic anatomical features; chlorophyll free aqueous-chambers making 50–80% of mesophyll, supported by a dense dark band of palisade cells from beneath.

Stem is slender, decumbent, woolly, spreading branches are 10-20 cm long with rooting at nodes. Its microscopy shows the presence of outer ring of peripheral vascular bundle in addition to central vascular system.

Further, the bicolored, moniliform hair of staminal filaments of flower (fig 4); oblong – pyramidal, brownish – black, faintly rugose seeds with fissures on one side and its apex is crowned with a distinctive circular concave disc having a small conical knob at the centre (fig 5); the typical monocotyledonous stomata on the lower epidermis surrounded by four hexagonal cells in cruciate arrangement (Fig 6); upper epidermis with compact cells (Fig 7); typical parallel veination in the leaf lamina (Fig 8); quantitative microscopic data, physicochemical constants and phytoconstituents in various extracts, documented in this communication may be use full for researchers to identify and decide the authenticity of this medicinal plant from other similar and related varieties.

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**REFERENCES**