Pharmacognostical evaluation of root bark of *Streblus asper* Lour.

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*Streblus asper* Lour. known as *Shakhotaka* in Ayurveda and *Piraayan* in Siddha is an important medicinal plant belonging to family Moraceae. The root bark is antipyretic, antisyptic and analgesic, and sedative. The study provides taxonomical, pharmacognostical and physicochemical details helpful in laying down standardization and pharmacopoeial parameters. The diagnostic characters are latex exudation, lenticular opening, crystals and latex cells in secondary phloem, 2-3-seriate medullary rays, and septate fibers. Physicochemical studies revealed, total moisture content (8.91%), total ash (15.00%), acid insoluble ash (5.65%), water-soluble ash (3.23%), alcohol soluble extractive value (18.05%), and water-soluble extractive value (35.83%). Ultraviolet analysis exhibited considerable variation. Preliminary organic analysis revealed carbohydrates, glycosides, phytosterols, phenolic compounds, tannins, saponin, gums and mucilage. Thin layer chromatographic studies gave 8 and 7 spots in alcohol and aqueous extracts, respectively.

**Keywords:** *Streblus asper*, Pharmacognosy, Physicochemical analysis

**IPC Int. Cl.**: A01K61/00, A61P1/04, A61P1/06, A61P1/10, A61P1/16, A61P29/00

*Streblus asper* Lour., (Moraceae), known as Demon tree is an important medicinal plant belonging to family Moraceae. Large shrub or small tree with crooked stem, bark light grey or greenish with faint ridges, laticiferous. Leaves alternate, 5-7×3.5-4 cm long, rhomboid-elliptic, obovate or elliptic-oblong, acute, cuneate at base, denticulate, glabrous. Flowers unisexual, axillary; male flowers in globose pedunculate heads; stamens 4, inflexed in bud, anthers reinform; female flowers solitary, inconspicuous, long peduncled. Fruit 1-seeded berry, enclosed by enlarged sepals. The root bark and seeds are used in Ayurveda as a single drug for treatment of diarrhoea, dysentery, filariasis, diseases of nervous system and fever, whereas in Siddha medicine, root bark, leaf and exudate (latex) are used for dysentery, fissures, sprue, as an aphrodisiac, and also for dental diseases. The extracts showed anticancer and antiallergic activity. The major glycoside in root bark is vijaloside, known for its cardiac activity apart from β-sitosterol, α-amyrin and luepol from leaves. Pharmacognostical investigation with macerate and powder study details on root bark which help in identification of crude drug was not available and hence the study was undertaken.

**Methodology**

Fresh root bark collected from Botanical garden of the University of Agricultural Sciences, GKVK campus, Bangalore was preserved in 70% ethyl alcohol for histological studies. Pharmacognostical evaluation including histochemical, macerate and powder studies were carried out by taking free hand sections. Photomicrographs were taken using compound binocular microscope having sensor aided digital camera and computer attachments. Measurement of cells of tissues was also carried out. Physicochemical constants, ultra-violet analysis, organic analysis and thin layer chromatography were carried out from shade dried powder. Voucher herbarium specimen along with voucher crude drug sample is preserved at the herbarium of MS Ramaiah College of Pharmacy, Bangalore. Botanical identification was carried out using local floras.

**Results and discussion**

Fresh root bark of 2–7 mm thick, peeling off when dry, outer surface pale yellow, lenticellate, inner surface fibrous within, brown was taken. Mature dry root bark incurved, yellowish-brown to chocolate brown, bitter, without characteristic odour; fracture hard (Fig. 3) was taken for study. Transverse section of root bark shows cork, consisting of 4–8 layers of tangentially elongated cells, 15-23-31μ,
interspersed by dark coloured lenticular openings. Cork cambium single layered, followed by 2-3 layers of secondary cortex and a large secondary phloem. Cortical cells thin walled, parenchymatous, rectangular or polygonal, 7-20-33μ, contain simple round starch grains. Groups of stone cells, 22-41-60μ, in tangential bands occur next to secondary cortex. Secondary phloem consists of phloem parenchyma, sieve tubes, companion cells and phloem fibers; phloem parenchyma cells thin walled, variable in size and shape, 26-47-58μ, elongated, either tangentially or radially, contain starch grains, 22-41-60μ (diameter) and large prismatic, rhomboidal or spheroidal crystals of calcium oxalate, and abundant laticiferous cells. Phloem fibers radially arranged, in vertical columns, intermingled with phloem parenchyma and alternating with medullary rays. Medullary rays multiseriate, run in parallel rows separating phloem, almost up to secondary cortex; cells rectangular or polygonal, radially elongated, thin walled, 15-28-40μ, contain simple starch grains and crystals; stone cells are specifically found more in medullary ray region (Figs. 4-14).

Macerate shows rectangular or polygonal cortical cells, 9-18-27μ, contain starch grains; irregular parenchyma cells; phloem fibers 14-18-22μ, septate, thin walled, with a large lumen; groups of thick walled stone cells, simple pitted and with broad lumen; laticiferous cells with granular content (Figs. 15-19).

Powder study shows powder yellowish, odourless, bitter, fibrous; when treated with chloral hydrate solution, stained in 1% safranin for 5-10 minutes, mounted in 50% glycerine shows cork cells, parenchyma cells and phloem fibers; with iodine solution, gave blue colour indicating presence of starch. Results of histochemical tests are provided (Table 1). The % of moisture content was 9.2, total ash 15.0, acid insoluble ash 5.6, water soluble ash 3.2, alcohol soluble extractive 18.0 and water soluble extractive 35.8; the % of successive extractive values were petroleum ether (60-80°C) 4.08, benzene 0.73, chloroform 1.39, acetone 0.59, ethanol 6.16 and water 7.61. A known quantity of dried powder was extracted in a Soxhlet with petroleum ether (60-80°C), benzene, chloroform, acetone and ethanol (95%) and finally macerated with chloroform-water for 24 hrs successively and tested for different constituents revealed carbohydrates, glycosides, phytosterols, phenolic compounds, tannins, saponins, gums and mucilage. The alcohol and aqueous extracts were used to carry out TLC with solvent system, chloroform: ethanol [8:2] for alcohol extract and pet ether (60-80°C): ethyl acetate [6:4] for aqueous extract (Figs 20, 21). Iodine vapours were used as developer. Alcohol extract gave 8 spots of Rf 0.11, 0.29, 0.43, 0.52, 0.80, 0.91, 0.97 and aqueous extract 7 spots of Rf 0.08, 0.11, 0.14, 0.43, 0.62, 0.85 and 0.97 (Figs. 20, 21). Powdered drug under UV and ordinary light when treated with different reagents emitted various colour radiations (Table 2) which help in identifying the drug in powder form. Diagnostic characters of root bark include: presence of lenticular openings; presence of different types of crystals and

<table>
<thead>
<tr>
<th>Material Reagent</th>
<th>Test for</th>
<th>Colour change</th>
<th>Result</th>
</tr>
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<tbody>
<tr>
<td>Section Iodine</td>
<td>Starch</td>
<td>Blue</td>
<td>++</td>
</tr>
<tr>
<td>Section Ferric chloride solution (10%)</td>
<td>Tannin</td>
<td>Black</td>
<td>++</td>
</tr>
<tr>
<td>Section Sudan III solution</td>
<td>Oil globules</td>
<td>No change</td>
<td>− −</td>
</tr>
<tr>
<td>Section dil HCl + pinch of phloroglucinol</td>
<td>Lignin</td>
<td>Majenta colour</td>
<td>++</td>
</tr>
<tr>
<td>Section con HCl</td>
<td>Calcium oxalate crystals</td>
<td>Little effervescence</td>
<td>++</td>
</tr>
</tbody>
</table>

+: present; − : absent

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Visible light</th>
<th>UV light short wave (254 nm)</th>
<th>UV light long wave (365 nm)</th>
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<tbody>
<tr>
<td>Powder as such</td>
<td>Light brown</td>
<td>Light brown</td>
<td>Light brown</td>
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<tr>
<td>In methanol</td>
<td>Dark brown</td>
<td>Dark green</td>
<td>Brown</td>
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<tr>
<td>In methanol NaOH</td>
<td>Brown</td>
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<tr>
<td>In ethanol</td>
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<tr>
<td>In ethanol NaOH</td>
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<td>Light brown</td>
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<td>In dil HCl</td>
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Fig. 13 Sec. phloem fibers and crystals (x120)

Fig. 14 Cork cells with starch grains (x130)

Fig. 15 Parenchyma cells (x130)

Fig. 16 Phloem fiber (x80)

Fig. 17 Septate phloem fiber (x120)

Fig. 18 Stone cells (x120)

Fig. 19 Laticiferous cell (x125)

Fig. 20 Aqueous extract chromatograms

Fig. 21 Alcohol extract chromatograms
latex cells in secondary phloem; groups of tangentially arranged stone cells in secondary cortex and septate fibres.

Conclusion
Pharmacognostical evaluation on *Streblus asper* Lour., root bark provide specific pharmacognostical parameters useful in scientific evaluation of drug. Dioecious nature of plant and presence of latex are important taxonomical characters. Root bark is identified by above mentioned diagnostic characters.

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References