

Pharmacognostical studies on *Vata shrung*, (*Ficus benghalensis* Linn. leaf primordium)

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The present communication deals with pharmacognostical and preliminary phytochemical studies on the leaf primordium of *Ficus benghalensis*, which is used in *Pumsavana Samskar* of Ayurvedic System of Medicine. Different plants parts are used to cure number of diseases in indigenous system of medicine. No reports are available on microscopical and phytochemical studies, hence, the present attempt was undertaken to investigate the microscopical and preliminary phytochemical studies. The study revealed the presence of simple starch grains, clustered calcium oxalate crystals, patches of rounded to polygonal stone cells with lignified cell walls, broad and narrow lumen, thick walled cells, abundant unicellular trichomes and brown tannin content.

Keywords: *Ficus benghalensis*, Indigenous medicine, Karnataka, Leaf primordium, Medicinal plants, Pharmacognostical characters, Phytochemical studies, *Vata shrunga*

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Vata is a large semi deciduous tree reaching a height of 21m or more with a stout girth attaining 7-9m. Tender shoots are pubescent, large number of aerial roots develops from the branches. Leaves are in clusters, alternate, stipulate and rounded or subcordate at the base. *Ficus benghalensis* is commonly found throughout India, grows wild on the sub Himalayan tracts, Circar Mountains, lower slopes of the deccan hills and Malabar coasts in deciduous and semi evergreen forests. It is grown in gardens and roadsides for shade¹ (Fig. 1). *Ficus benghalensis* Linn. known as *Vata* in Sanskrit, is one of the reputed *Panchavalkala* drugs of Ayurveda. Different parts of the plant are used for various medicinal purposes. The leaf primordium (leaf bud) is known as *Vata shrunga* in Ayurvedic System of Medicine (Fig. 2). As per Ayurveda *Nighantus*, *Vata shrunga* has the property of curing *daha* (burns), *thrishna* (thirst), *moorcha* (faintness), *raktapitta* (haemorrhage), *kapha* and *pitta*². According to Charaka, the tender leaf buds and shoots of *vata* (*Ficus benghalensis*,) and *kasmari* (*Gmelina arborea* Roxb.) are prescribed in haemorrhage. Infusion of young buds is useful in dysentery and diarrhoea. Concentrated juice of young leaf buds and fruits is an aphrodisiac and of much value in spermatorrhoea and gonorrhoea².

The leaf primordium of *vata* is used in traditional healthcare system of medicine for many diseases like diarrhoea, vomiting, thirst, *pumsavana samskara* conception and *pradara*. In case of diarrhoea, leaf buds of *vata* (*Ficus benghalensis*), *udumbara* (*Ficus glomerata* Roxb.) and *vattha* (*Ficus religiosa* Linn.) are crushed and kept in hot water for a day. The extract added with ghee and cooked with half part of sugar and quarter part of honey checks bleeding (*raktha stambana*)³. During vomiting, decoction made from the tender leaves of *jambu* (*Syzygium cuminii* Skeels) and *Amra* (*Mangifera indica* Linn.), *Usira* leaf bud (*Vetiveria zizanoides* Nash) and prop roots of *Vata* (*Ficus benghalensis*) mixed with honey is taken internally to alleviate vomiting, fever, diarrhoea, fainting and thirst⁴.

In case of *pumsavana samskar*, two intact healthy tender leaf- buds of *vata* (*vata shrunga*) plucked from two eastern or northern branches of banyan tree grown in cow shed, along with two healthy seeds of *dhanya masa* (*Vigna mungo* Hepper) and *gaura sarsapa* (*Brassica campestris* Hook. f. & Thoms.) is taken with curd during *pushya nakshatra*. The woman is administered before the manifestation of sex in the foetus in the third month after conception⁵. Another method of drug 3-4 drops of expressed juice of *Lakshmana* (*Ipomoea maxima* G. Don), *vata shrunga*

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(leaf buds of *Ficus benghalensis*), *Sahadeva* (*Vernonia cinerea* Less.), *viswadeva* (*Sida alba* Linn.) pestled with cow milk should be instilled in right nostril by the woman⁵.

Similarly, *vata shrunga* helps in the achievement of conception. In case of conception, leaf buds should be collected in bright fortnight and in pushya constellation, the women should instill herself in right or left nostril root juice of *swetabrhata* (*Solanum melongena* Linn.), leaves of *utpala* (*Nymphaea nouchali* Burm.f.) and *kumuda* (*Nymphaea alba* Linn.), root of *laksmiana* (*Ipomoea sepiaria*) and 8 *vata shrunga* (*Ficus benghalensis*). After instilling it in to nostril the woman should take rice and milk for five days before the marital relations. In another method, root of *Laksmiana* (*Ipomoea maxima*) pestled with cows milk should be taken orally or through nostrils⁵. Leaf buds of *vata* are also used in case of *pradara* (excessive discharge of menstrual blood), where leaf buds of *kasmarya* (*Gmelina arborea*), *vata* (*Ficus benghalensis*) and *danti* (*Baliospermum montanum* Muell.-Arg.) cooked in ghee separately is administered⁶. Since, the leaf buds are having medicinal values, an attempt was made to investigate the pharmacognosy of the leaf buds of *Ficus benghalensis*^{7,8}.

Methodology

Fresh materials of leaf primordia of *Ficus benghalensis* Linn. were collected from the surroundings of Bangalore in the month of July to August. For microscopical studies, free hand sections of fresh leaf primordium were cut, cleared with chloral hydrate solution and water, and stained with safranin according to the prescribed methods^{9,10}. A drop of HCl and phloroglucinol were used to detect the lignified cells in the cut sections and in the powder drug¹⁰. Photomicrographs were taken. Powder of the dried leaf primordia was used for chemical analysis. Physicochemical studies and preliminary phytochemical screening of the drug were carried out¹¹. The fluorescence behaviour of the powdered drug in different solutions towards the ordinary and ultraviolet lights was carried out¹². TLC studies of the petroleum ether at 60-80°C, and benzene, chloroform and ethanol extracts were carried out in various solvents at 30°C using silica gel G as adsorbant¹³.

Results and discussion

Macroscopically, fresh leaf primordium shows a thick outer covering, which is light green in colour

and small leaf primordia arranged alternatively. In general, leaf primordia occur in predictable positions with the site of the next primordia being specified by the location of the most recently appearing primordia like. The arrangement of LPS around the circumference of shoot apical meristem is as phyllotaxy. Shoot apical meristem is the site of small cellular out growth, called leaf primordia that develops into leaves. Leaf primordium measures 2-4 cm in length with 0.4-0.6 mm in width. In dry conditions, it is dark brown in colour with abundant trichomes on outer surface. Odour is agreeable and taste is slightly bitter. In transverse section, it shows different sequence of arrangements in concentric rings with the increase in the number of leaf primordia and with almost similar to microcellular details (Figs. 2-15).

Epidermis is single layered with abundant uniseriate trichomes. Ground tissues are multilayered with thin walled, elongated, compactly arranged parenchymatous cells, and small, compactly arranged or loosely arranged rounded parenchymatous cells with chloroplast. Simple starch grains are clustered with crystals of calcium oxalate. Later, these cells develop into palisade and spongy parenchymatous tissues. In between the rounded parenchymatous cells, continuously arranged small rounded vascular bundles with poorly developed xylem and phloem is present (Figs. 4-23). Different types of stone cells with thick walled are also present. Stone cells are elongated and rectangular with broad and narrow lumen along with lignified walls (Figs. 5, 8 10 & 17). TS of the middle and basal region show almost similar structures except in the development of leaf structures with the differentiation of midrib and laminar region. Chemical and organic analysis (Table 1), fluorescence studies (Table 2) and chromatographic studies (Table 3) of leaf primordium have been discussed (Fig. 3)

Diagnostic characters of leaf primordium

1. Presence of alternate arrangement of leaf primordia in different stages.
2. Presence of abundant and clustered crystals of calcium oxalate in the parenchymatous cells.
3. Presence of thick walled, rounded to polygonal stone cells (55-80-95x 25-45-50 μ) with heavily lignified cell wall with broad and narrow lumen.

Presence of rounded to elongated parenchymatous cells with simple starch grains (15-25-40 μ) and brown content of tannin.



Fig. 1 *Ficus benghalensis* Linn.

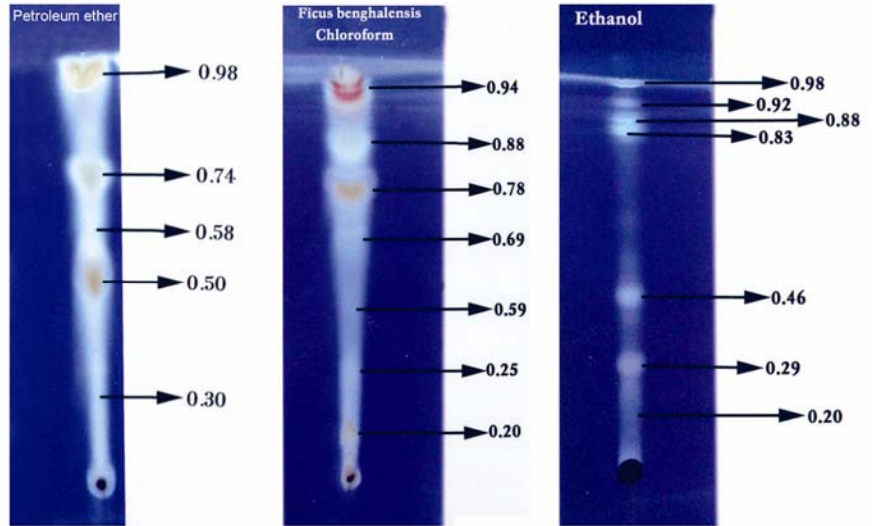


Fig. 3 TLC of Petroleum ether, Chloroform and Ethanol extracts



Fig. 2 *F. benghalensis* leaf primordium

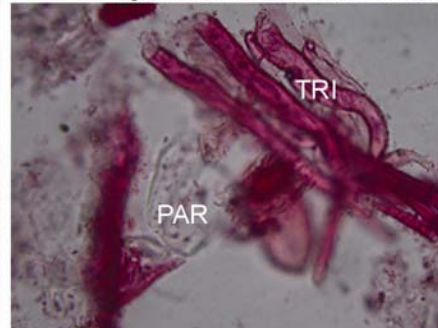


Fig. 4 Trichomes & parenchyma

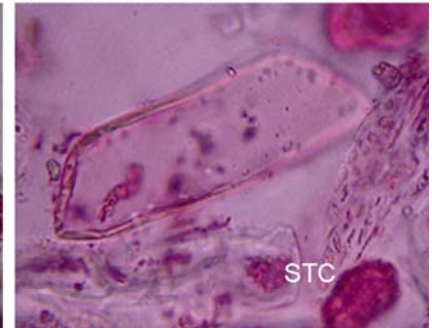


Fig. 5 Maceration showing stone cells

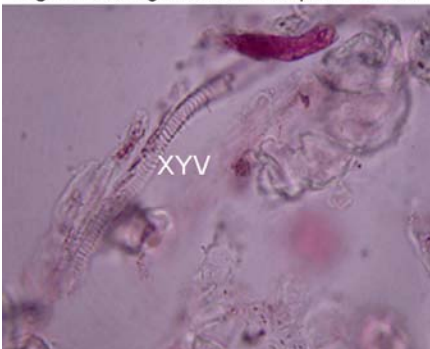


Fig. 6 Maceration showing xylem vessel

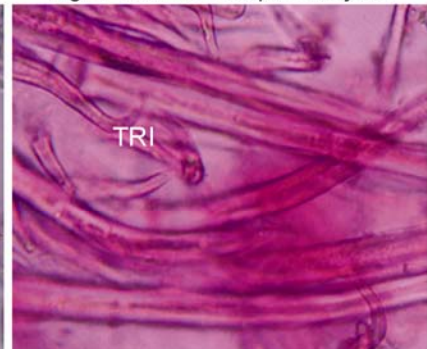


Fig. 7 Maceration showing trichomes

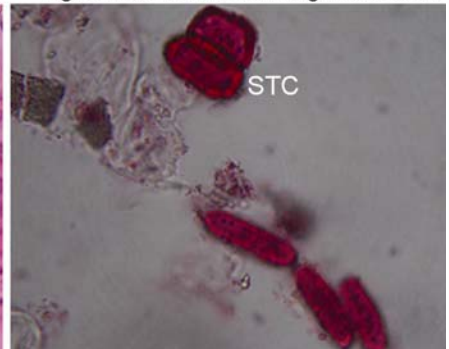


Fig. 8 Maceration showing stone cells

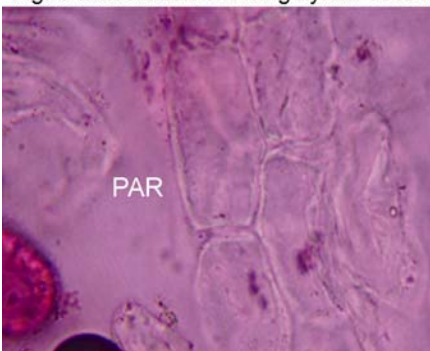


Fig. 9 Maceration showing parenchyma

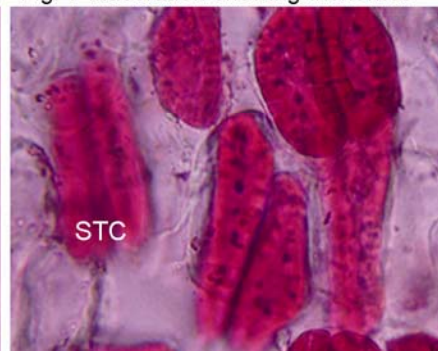


Fig. 10 Maceration showing stone cells

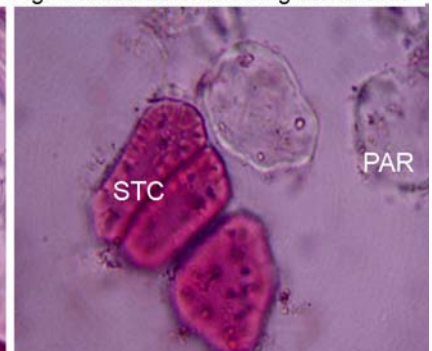


Fig. 11 Stone cells & parenchyma



Fig.12 TS of leaf primordium

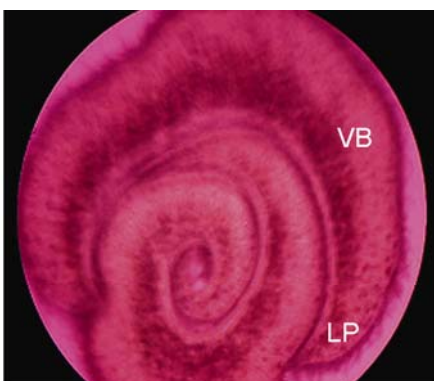


Fig.13 TS of leaf primordium

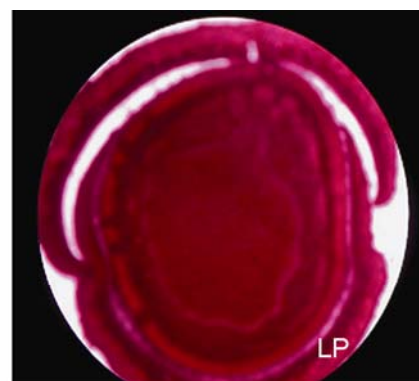


Fig.14 TS of leaf primordium

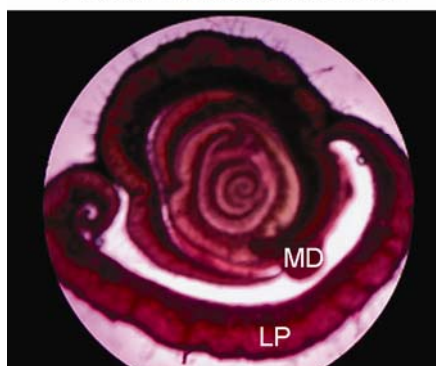


Fig.15 TS of leaf primordium

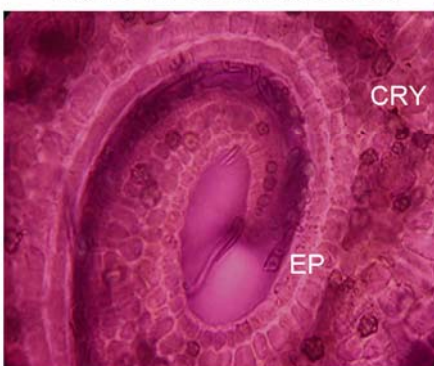


Fig.16 Epidermis and crystals

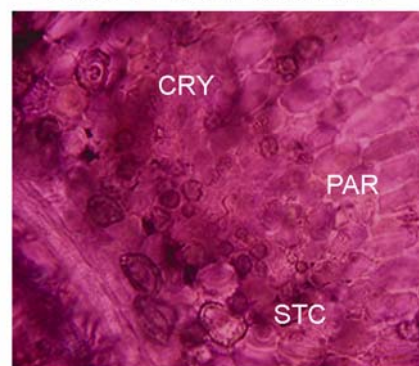


Fig.17 PAR, CRY and stone cells

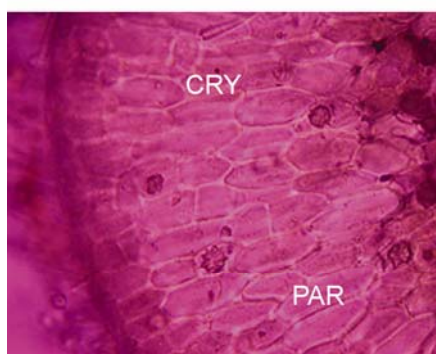


Fig.18 PAR cells and crystals

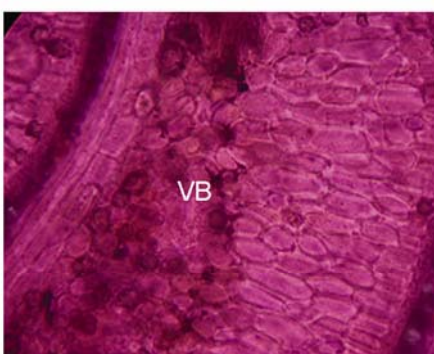


Fig.19 Vascular bundle.

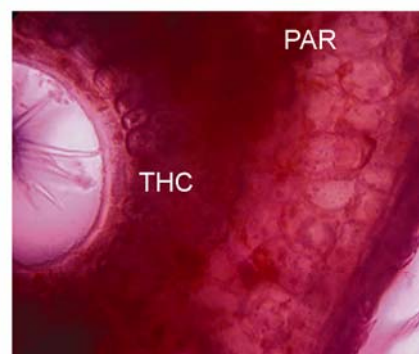


Fig.20 THC walled cells, PAR cells

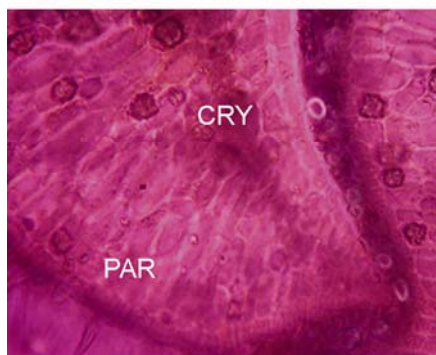


Fig. 21 PAR cells & CRY



Fig. 22 Enlarged vascular bundle

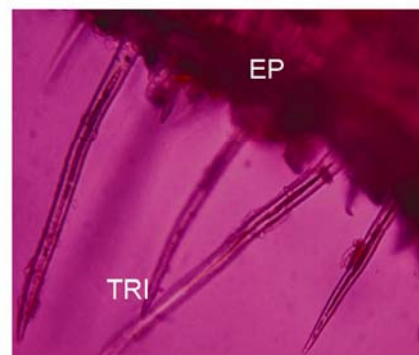


Fig. 23 Epidermis & uniseriate TRI

Table 1—Chemical and organic analysis of leaf primordium

Physical constants (Proximate analysis)		Organic analysis	
		Constituents	Presence or Absence
Foreign matter (%)	0.65	Steroids	Present
Moisture (%)	10.75	Tannins	Present
Ash (%)	10.92	Carbohydrates	Present
Acid in insoluble ash (%)	0.75		Absent
Water in soluble ash (%)	1.00	Flavonoids	Present
Solubility (%)		Triterpenes	Absent
Water	1.62	Alkaloids	Present
Alcohol	9.60	Saponins	
Extractive principle values (%)			
Petroleum ether	2.19		
Benzene	0.54		
Chloroform	0.23		
Water	0.63		

Table 2—Fluorescence studies of leaf primordium

Powder treatment	Visible rays	UV rays (short-254m μ)	UV rays (long-365m μ)
As such	Olive green	No fluorescence	Mud colour
Methanol	Dark green	No fluorescence	Mud colour
NaOH (Methanolic)	Dark green	No fluorescence	No fluorescence
Ethanol	Dark green	Ash colour	No fluorescence
HCl	Dark green	No fluorescence	Mud colour

Table 3—Chromatographic studies (TLC) of leaf primordium

S No	Extracts	Solvent system	Developer	Rf values
1	Petroleum ether	Benzene:Ethanol 19:1	5% concentrated sulphuric acid in methanol	0.30,0.50,0.58,0.74,0.98
2	Chloroform	Chloroform:Methanol 19:1	5% concentrated sulphuric acid in methanol	0.20,0.25,0.59,0.69,0.78,0.88,0.94
3	Ethanol	Toluene:Ethylacetate 9:1	5% concentrated sulphuric acid in methanol	0.20,0.29,0.46,0.83,0.88,0.92,0.98

Presence of abundant uniseriate trichomes on upper side of the epidermis.

Conclusion

The pharmacognostical and phytochemical studies carried out on the leaf primordium of *Ficus benghalensis* (*vata shringa*), used in the traditional system of medicine for *garbha sthambana* and *pumsavana samskar* will be of immense use in carrying out further research and revalidation of its use in Ayurvedic System of Medicine.

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