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RESEARCH ARTICLE

A NEW SPECIES OF THE *PHYLLANTHUS VASUKII* SP. NOV. (PHYLLANTHACEAE) - FROM SOUTHERN EASTERN GHATS OF INDIA.

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Abstract

A new taxaon, ***Phyllanthus vasukii sp. nov.***, is described from the Southern Eastern Ghats. A detailed description, Phenology, Anatomical Characters, Micromorphology of seeds, Distribution and Ecology notes and IUCN status are provided for easy identification.

Introduction:-

Phyllanthaceae is the second largest segregate of Euphorbiaceae *sensu lato*, comprising c. 2000 species in 49 genera. Phyllanthaceae includes two subfamilies, Phyllanthoideae and Antidesmatoideae. Phyllanthoideae consists of four tribes and *Phyllanthus* belongs to the tribe Phyllantheae. Members of Phyllanthaceae are pantropical and include trees, shrubs, phyllocladous taxa, semi – succulents, annual herbs, and even a free floating species. The recent classification of angiosperms recognises five lineages of *Euphorbiaceae sensulato* at family rank: *Euphorbiaceae sensu stricto*, *Pandaceae* Engl. & Gilg, *Phyllanthaceae* Martynov, *Picrodendraceae* Small and *Putranjivaceae* (APG III, 2009).

Most Phyllanthaceae, are uniform with pinnate venation, entire margins and simple indumentums. Flowers are small and actinomorphic but display great diversity in shape, size and number of floral organs (Hoffmann *et al*., 2006; Kathriarachchi *et al*., 2006). The genus *Phyllanthus* L. was first described by Linnaeus in 1753 and consists of *ca*.833 species (Govaerts *et al.*, 2000) in the world and is chiefly distributed in moist humid tropics. In India, it is represented by *ca.* 40 species (Henry & Santapau, 1973), although Hooker f. (1887) has recorded 56 species from the then British India. In total, 12 species of herbaceous *Phyllanthus* have been identified in India.

Webster (1955, 1956a, b, 1957, 1958, 1967, 1970 and 1994; Webster and AiryShaw, 1971) has worked exhaustively on *Phyllanthus* and has provided detailed taxonomy. In course of botanical exploration of local region of Southern Eastern Ghats some exciting specimens of *Phyllanthus* were collected. After critical examination and perusal of literature, these specimens were determined as belong to a distinct new taxon of the genus *Phyllanthus*, which is being described here.

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Materials and Method:-

The plant specimens for collected from various parts of South India and the variations among these two plants were studied using fresh materials as well as herbarium specimens. The morphological and anatomical characters were recorded by examining several specimens of each species with the help of stereomicroscope and inverted phase-contrast microscope, respectively. Details about the distribution, habitat, local name and uses were taken from literature, herbarium data bank and field studies. Anatomical studies were conducted by hand sectioning and stained with safranin stain and glycerine.

Morphological study:-

The morphological characteristics of the specimens described herein as *Phyllanthus vasugii* sp.nov. were compared with those of the allied species, *P. urinaria* L.

Table.1:- The difference between of ***Phyllanthus vasukii sp. nov***.and ***Phyllanthus urinaria.***

Attributes	***Phyllanthus vasukii sp. nov.***	***Phyllanthus urinaria.*****L.**
Habitat	Shrub	Herb
Leaf size and shape	5-20m long, 2-7mm broad, linear to oblong, When touched, the leaves not fold.	6-15m long, 3-15mm, broad oblong, When touched, the leaves fold in automatically.
Leaf apex	Mucronate	Mucronate
Stem colour and form	Dark green, round, not smooth, Branches and branchlets are stout and erect, tetra gonal, very rarely branched, glabrous and woody at base.	Reddish-green, not round, smooth, Branches and branchlets are mostly weak and drooping, pentagonal, branched, glabrous and woody at base.
Fruit and flower colour	Greenish fruits and whitish green teplas. 6-capillary fruit. 6 dehiscent cocci each fruit.	Reddish fruits and reddish green tepals. 3-carpellary fruit. 3 dehiscent cocci each fruit.
Number of tepals	Hexatepalous (6)	Hexatepalous (6)
Nature of stipules	Greenish and closely attached	Reddish and laterally free
Plant height	Up to 150 cm high	Up to 60 cm high

Micromorphology study:-

Table.2:- Difference between anatomical Characters of the *Phyllanthus urinaria* and *Phyllanthus vasukii species* (Fig.2.).

Part of the plant species	**Characters**	***Phyllanthus urinaria***	***Phyllanthus vasukii***
LEAF	Number of palisade parenchyma in the mesophyll.	2 layer thick	1 layer thick
	Nature of intercellular spaces	Large	Small
	Nature of xylem cells within the mid rib	Clustered cells 2 layers thick	Clustered cells 3 layers thick
STEM	Epidermal circumference	Regular angular	Irregular angular
	Ridges and Furrows	Present	Present
	Hypodermis (Collenchyma)	Rectangular 2-5 layers thick on ridges 1-2 layers thick on furrows	Rectangular 2-4 layers thick on ridges 2 layers thick on furrows
	Oil ducts	Absent	Present
	Cortex (Parenchyma)	Oval & Polygonal 2-5 layers thick	Polygonal 1-9 layers thick
	Pericycle (Sclerenchyma)	2-4 layers thick	3 layers thick

	Xylem	2-5 elongated cells	2-8 elongated cells
	Phloem	3-5 elongated cells	2-8 elongated cells
	Ground tissue	Small	Very large
ROOT	Cork cells	8-11 cell thick	2-7 cell thick
	Cortex	2-4 cell thick	6-9 cell thick
	Xylem	11-43µm	8-25 µm
	Phloem	4-8 cell thick	8-11 cell thick

To distinguish ***Phyllanthus vasukii*** and ***Phyllanthus urinaria*** between lateral, dorsal and ventral ornamentation of the seed surfaces was analyzed by microscopy. Three types of surface ornamentation patterns were presented in the Table-3.

Table.3:- Micromorphology of seeds of features between of *Phyllanthus vasukii* and *Phyllanthus urinaria*.

Taxa Seed ornamentation *Phyllanthus* L.	Seed ornamentation		
	Dorsal	lateral	Ventral
Phyllanthus vasukii	Transversal ribs, aligned on a irregular microverrucose on ribs, with valleys	Stellate verrucose regular concentric C-shape alignment, with crusts	Regular or irregular concentric C-shape ribs, regular longitudinal finger-shape rodlets
Phyllanthus urinaria.	Transversal ribs, microverrucose on ribs, crusts on valleys	Asymmetrical longitudinal ribs valleys, microverrucose on ribs, crusts on valleys	Asymmetrical longitudinal ribs, microverrucose on ribs sometimes branched ribs, crusts on valleys

***Phyllanthus vasukii* parthipan *et al*., sp. nov.**

Shrub woody, erect, up to 150 cm high. Leaf sessile, bipinnate, opposite, entire, leaf let linear to oblong, pale green, 5-20 x 2-7 m, mucronate apex, the base slightly oblique, unequal; stipules linear, very finely puberulous on lower sides leaf margin; lateral veins in 3–5 pairs; reticulation inconspicuous on both sides. Stem green, suffrutescent, sticky angled, rarely branched, glabrous herb, 50-120 cm high, Stem diameter 2.0 – 2.9 mm. Rarely branchlets up to 35 cm long, with up to 50 leaves, Flowers, mostly bisexual fascicles, 6 petals, very small, 6-merous, axillary, ca. 1 mm in diameter. Higher leaf axils bear only solitary male flowers no paired, with female flowers in the lower axils zig- zag arrangement, single or sometimes paired. Male flowers : Pedicels 0.2–0.5 mm long; sepals 6, ovate or elliptic, 0.2–0.5 by 0.5–0.3 mm, white transparent green middle strip; disc glands 6, star-shaped or orbicular; stamens 3, staminal column 0.1–0.2 mm long, anthers 0.1–0.2 mm long. Female flowers : pedicels 1.0 – 1.5 mm long; sepals 6, obovate-oblong or lanceolate, 0.5–0.9 by 0.3–0.6 mm, glabrous, apex acute with broad red pinkish scarious margin with greenish sepals in the middle; disc glands 6; ovary covered with scurfy-tuberculate ; styles 0.2–0.9 mm long; stigma c. 0.5 mm long. Fruit green, pedicel 1.0–1.5 mm long, 0.5–1.5 mm diam, capsular, depressed globose, densely verrucous, cocci 3 , not spiny. Seeds are transversely ribbed on the back, and sides. Seed 2 in each cocci, 0.8–1.9 by c. 1 mm wide, 2-angled, curved on dorsal side, smooth sand in colour. **(Fig.1.)**

Flr. & Fr.: Throughout the year.

Etymology: The new species is named in honour of **DR.A.VASUKI**, Secretary, Kongunadu Arts & Sciences College, Coimbatore for her significant contribution in the field of Science.

Distribution: Endemic to Tamil Nadu part of South India.

Habitat and ecology: Growing along the cultivated land, especially wetland field, in moist grassy wetland. Namakal District (11°14′N 78°10′E / 11.23°N 78.17°E), Tamil Nadu, India.

Conservation measures:

The significance of field research is the detection of novel additions to a floristic region, which subsequently improve our understanding of plant biogeography, species diversity. This species is extremely very rare and known only from type locality with limited population density. This should be included in the Red Data Book of Indian plants. The known localities have already covered by Eastern Ghats. However, the new plant should be propagated by using biotechnology method and also to conserve under *ex- situ* conditions.

Conclusion:-

In present study, we observed that *Phyllanthus urinaria* differ from *Phyllanthus vasukii* and by their height, and leaves numbers, stem,When touched, the leaves not in fold in automatically, Six capillary fruit. 6 dehiscent cocci in each fruit. Anatomical studies also confirmed the new species *Phyllanthus vasukii* by Nature of intercellular spaces large in leaf, Epidermal circumference in regular angular stem and oil ducts present in stem. Entirely different of number of root arrangement cells, *etc.* Micromorphology of seeds of features very different between of *Phyllanthus vasukii* and *Phyllanthus urinaria.* By this, we confirmed that *Phyllanthus vasukii* can be treated as a new species due to the presence of variation in both morphological, Micromorphology of seeds and anatomical characteristic features.

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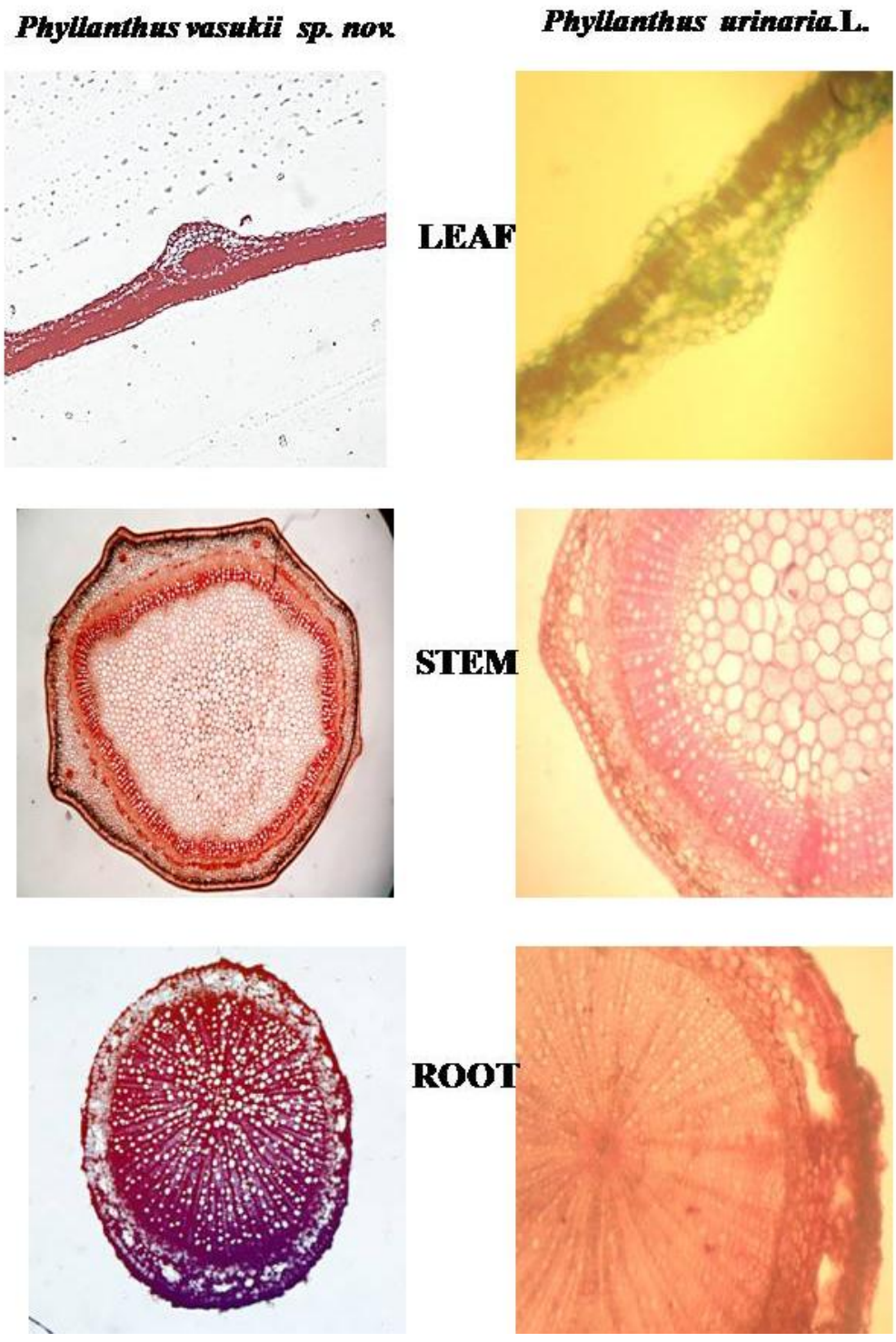
Fig.1:- *Phyllanthus vasukii* Parthipan *et al..*,

Fig.1: Difference between anatomical Characters of the *Phyllanthus urinaria* (Daniel *et al.*, 2015) and *Phyllanthus vasukii species* .



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