research article | International Journal of Plant Sciences, (January to June, 2010) Vol. 5 Issue 1 : 184-187

Pharmacognostical studies on *Polyscias balfouriana* var. marginata leaf and root

S. SANDHYA, K.R. VINOD AND RAJESH KUMAR NEMA

Accepted : November, 2009

SUMMARY

In the present work an attempt has been made to study the various macroscopical and microscopical investigations on the leaf and roots of *Polyscias balfouriana* var: *marginata*, family Araliaceae. Some important salient features observed in the leaf were unicellular covering trichomes, vascular bundles, anisocytic stomata and parenchymatous cells containing calcium oxalate crystals. The root powder showed large fibers, fragments of cork arranged as layers of bricks.

Key words : *Polyscias balfouriana*, Araliaceae, Saponin, Hemolytic

Polyscias balfouriana is a woody, bushy tropical shrub in habitat (Fig. 1). It is available through out the warmer parts of India, especially in Kerala and Tamil Nadu. It is also available in tropical Asia and Malaya. It is a native of New Caledonia. These plants are popularly known in trades and horticultural nurseries as "Aralias"since they belong to the family Araliaceae. Many biological active triterpenoid glycosides were isolated from this plant family. The chemical studies on saponins and sapogenins revealed that the triterpenoid content in this family play an important role in the pharmacological activity like stimulation of the CNS, antifatigue and enhancement of non-specific resistance. Since there is no report on the micro-morphological work on this plant, the present study was undertaken. They also have hemolytic activity and when injected into the blood stream was very toxic (Nayanar, 1985; Stephen, 1990; Parpharsarang and Reynaud, 1989; Indian Pharmacopoeia, 1996; Evans, 2002).

MATERIALS AND METHODS

Fresh whole plants of *P. balfouriana* var.Marginata (PBM) were collected from Botanical garden, Tamilnadu Agricultural University, Coimabatore. The leaves and roots were separated from the plant and thoroughly washed with running water to remove the adherent impurities. Some quantity of the leaves and roots were air dried, powdered and stored in air-tight containers. Fresh leaves and roots were used for the section cutting. Free hand sections of the leaf and root were taken and the various microscopical studies were carried out after clearing the T.S. and powder with chloral hydrate and staining with phloroglucinol and hydrochloric acid. The fresh leaves of *P. balfouriana* were subjected to quantitative microscopical analysis.

Macroscopical studies:

The leaves (Fig. 1)are large leathery ,somewhat concave, variable at first ,entire, later usually of three rounded, coarsely toothed, glossy green leaf lets, 3-10cm across, often with white margins, on bronzy stems, speckled grey. Leaves are ovate, reniform, serrated compound leaves with aromatic odour and characteristic taste (Donal; Khandelwal).

The roots (Fig. 1) are long, tapering towards the end.

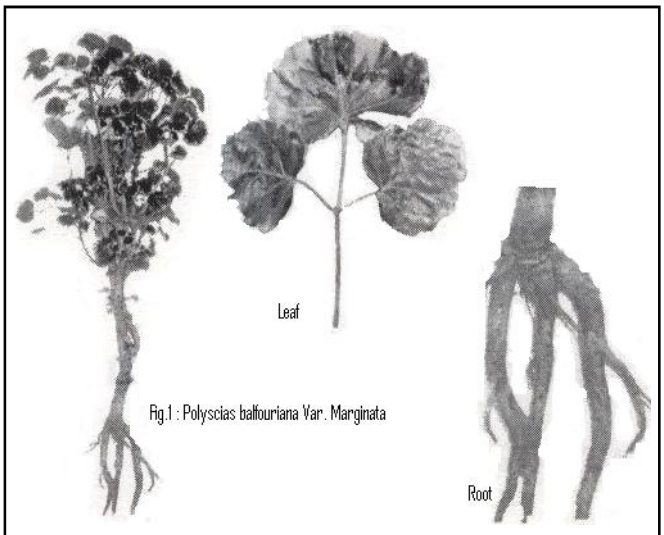

Fig. 1 : ***Polyscias balfouriana*** **var. marginata**

Correspondence to:
S. SANDHYA, Nalanda College of Pharmacy, NALGONDA (A.P.) INDIA
Authors' affiliations:
K.R. VINOD, Nalanda College of Pharmacy, NALGONDA (A.P.) INDIA INDIA
RAJESH KUMAR NEMA, Rishiraj College of Pharmacy, INDORE (M.P.) INDIA

It is yellowish brown in colour with root hairs on its surface. They are 20-27cm long and 5-7 cm in diameter. It has indistinct odour and characteristic taste.

Anatomy of P. balfouriana leaf:

A thin T.S of the leaf (Fig. 2) showed the following characters.

Lamina:

A single layer of longitudinally arranged upper epidermis is present. The mesophyll cells are constituted by the spongy parenchyma and the vascular strands with dark stripes. Calcium oxalate crystals are present in parenchymatous cells. Lower epidermis similar to the upper epidermis. Unicellular covering trichomes are seen rarely in the upper epidermal region.

Mid rib:

The midrib region is mainly occupied by the cortical parenchyma with bicollateral vascular bundles. In addition to the external phloem another patch of phloem occurs on the inner side which is called as the internal phloem. Just below the upper and lower epidermis a patch of collenchyma cells are present.

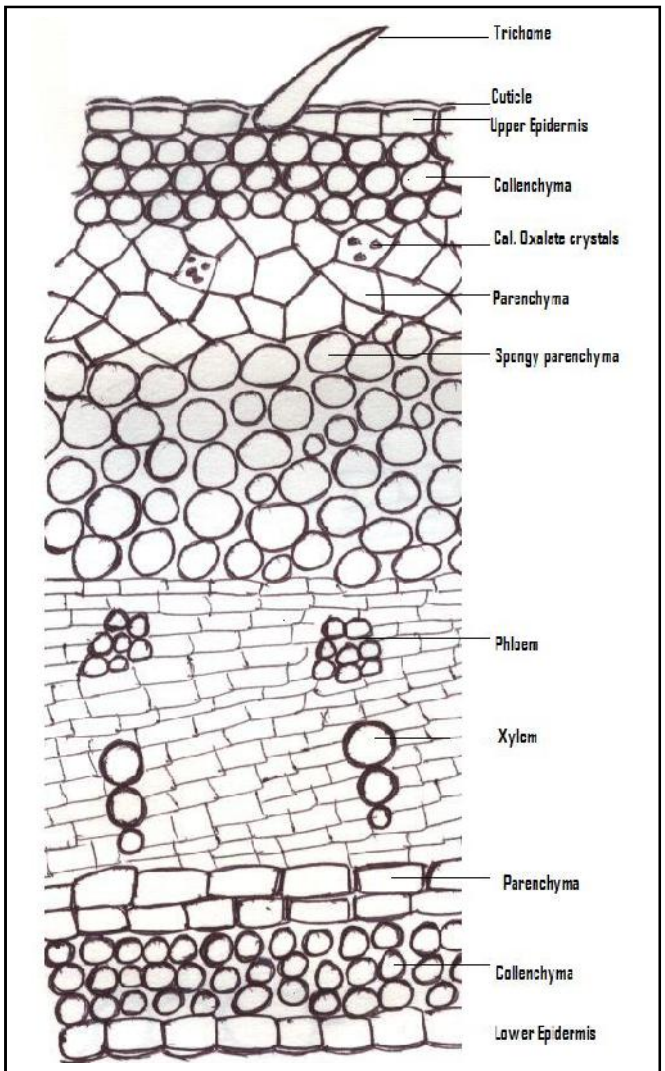

Fig. 2 : T.S. of PBM leaf

Tissue of diagnostic importance in the leaf powder:

The leaf powder of *P. balfouriana* is dark green in colour with an aromatic odour.The following are the salient features observed in the leaf powder (Fig.4).

– Unicellular covering trichomes are present with a bulbous base and more or less pointed apex.

– A layer of epidermal cells are present.

– Vascular elements usually found in the mesophyll region.

– Anisocytic type of stomata is present.

– Parenchymatous cells containing calcium oxalate crystals.

Anatomy of P. balfouriana root:

The major features observed in the T.S. of the root (Fig. 3) are the following.

Cork:

Phellem consists of cork cells which appear

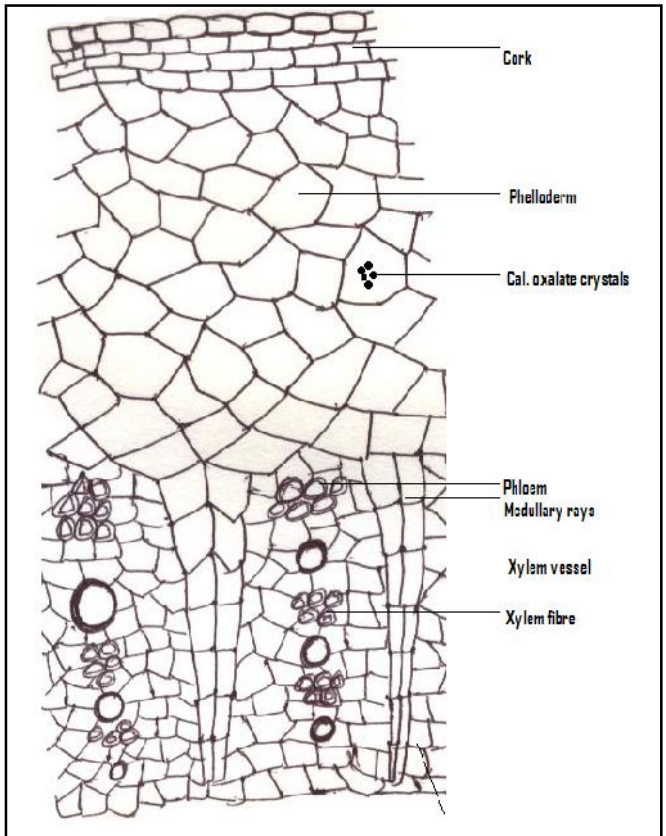

Fig. 3 : T.S. of PBM root

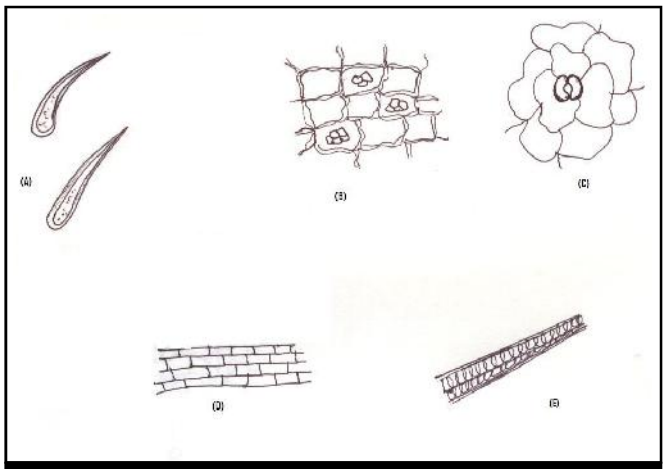

Fig. 4 : Powder of PBM leaf

tangentially elongated in T.S. and polygonal in surface view. The cell contents are granular and brown in colour.

Phellogen is indistinct:

Phelloderm: Consists of 2-4 rows of thin walled cells usually containing calcium oxalate crystals in the cortical parenchyma.

Secondary phloem: Is characterized by the presence of large number of phloem fibers arranged in concentric circles.

Secondary xylem: All the features in the xylem are lignified and are made up of fibrous cells and large xylem vessels.

Medullary rays: Are biseriate in nature. The cells in the medullary rays appear to be broader towards the phloem region and narrow towards the xylem. Starch grains occur as single grain having well marked hilum.

Tissues of diagnostic importance in the root powder:

The root powder of *P. balfouriana* is yellowish brown in colour with characteristic taste. The major tissues of diagnostic importance observed were the following as shown in the (Fig. 5).

- Fragments of cork arranged as layers of bricks.
- Fibres are large, lengthy and open at ends.

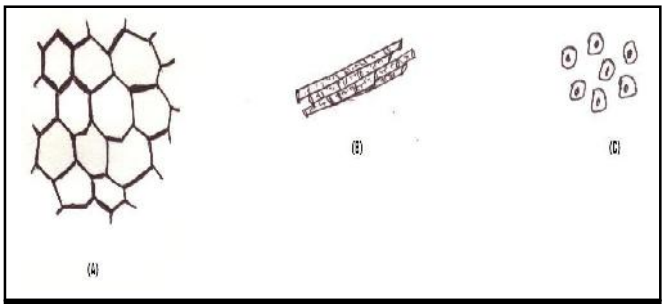

Fig. 5 : Powder of PBM root

- Big fragments of pitted xylem.

Quantitative microscopical analysis:

The fresh leaves of *P.balfouriana* were subjected to the quantitative microscopical analysis *viz*., vein islet number, vein termination number, stomatal number and stomatal index. The results obtained were tabulated in Table 1 (Kokate).

Table 1: Quantitative Microscopical Data

P. balfouriana leaf	Vein islet number	Vein termination number	Stomatal number	Stomatal index
Upper epidermis	1-2	4-6	7	16.27
Lower epidermis	1-2	4-8	15	30.00

RESULTS AND DISCUSSION

The histological studies on the leaves of *P.balfouriana* showed the presence of distinct lamina and midrib region. The epidermal region rarely showed the presence of unicellular covering trichome with bulbous base and pointed apex. Cruciferous stomata and calcium oxalate crystals were also observed in the powdered microscopy of leaf. The quantitative microscopy revealed that stomatal index of the lower epidermis was double than the upper epidermis.

The histological studies of the root showed the presence of cork arranged as layers of brick, lignified secondary xylem vessels and large phloem fibres with open ends.

REFERENCES

Donal, Alexander Thomas. *Plant Micro Techniques*. 1st edn. p.192.

Evans, W.C. (2002). Trease and Evans *Pharmacognosy*. 15th edn. W.B. Saunders. London. p.289.

Indian Pharmacopoeia (1996). The Controller of Publications, Delhi. 2: p-2, p A-54.

Khandelwal, K.R. *Practical Pharmacognosy-Techniques and Experiments*. 9th Edn. Nirali Prakashan, Pune. p. 31-38.

Kokate, C. K. *Pharmacognosy*. 2nd Edn. Vallabh Prakashan. p.508-525

Nayanar, M.P. (1985). *Meaning of Indian Flowering Plantnames*. p.280.

Parpharsarang, S.J. and Reynaud, Lussigrol M. (1989). *J. Natural Products*, 239-242.

Stephen, Black Mose.(1990). *Illustrated Guide to Wild life*. p.144.

****
*****