



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## SURVEY AND DOCUMENTATION OF THE FAMILY PODOSTEMACEAE IN DIFFERENT LOCALITIES OF POOYAMKUTTY, ERNAKULAM DISTRICT, KERALA, INDIA

Nileena C.B.<sup>1</sup>, Vinod Haridas<sup>2</sup>

Assistant Professor, Department of Botany, Sree Narayana College, Cherthala, Alappuzha<sup>1</sup>; Associate Professor, Department of Botany, T.K.M.M. College, Nangiarkulangara, Alappuzha<sup>2</sup>.

**Abstract:** Pooyamkutty is a remote village situated along the Kuttampuzha river, a tributary of Periyar. It is part of Western Ghats and it is close to Iravikulam National Park and Anamalai Tiger Reserve and they share boundary with Pooyamkutty. Podostemaceae is a unique rheophytic angiosperm family which is abundant in almost all the 44 rivers of Kerala. Presence of Western Ghats combined with the North-East and South–West Monsoons provide a sub-tropical climate and seasonal flooded mountainous rivers ideal condition for Podostemaceae. In the present survey, the investigators were able to gather 5 genera and 6 species of the Family Podostemaceae from different localities of Pooyamkutty: *Indotristicha ramosissima*, *Dalzellia ceylanica*, *Polypleurum stylosum*, *P. prostratum*, *Podostemum subulatum* and *Zeylanidium lichenoides*.

**Index Terms -** Pooyamkutty, Podostemaceae, *Indotristicha ramosissima*, *Dalzellia ceylanica*, *Polypleurum stylosum*, *P. prostratum*, *Podostemum subulatum*, *Zeylanidium lichenoides*

### I. INTRODUCTION

Podostemaceae is the largest submerged flowering plants, commonly known as "river weed family". Due to its simplicity in structure, they resemble Algae and Bryophytes. The members grow in fast flowing streams, rivers and water falls with distinct seasonal fluctuations in water levels. Vegetative growth occurs during high water level and flow in the rainy season, flower and fruits develop during low water level and flow in the dry season. Many of the Podostemaceae species are annuals and others are perennials. Willis (1902, b) has pointed out that these plants have been derived from some terrestrial group. Since the structure of the flower and fruit is typically adapted to land life. According to Willis (1902) no other family of Indian flowering plants is so imperfectly known as the Podostemaceae. They are incapable of growing in still water. The plant body is thalloid since they do not have well organized root or shoot. The thallus is attached to the substratum by means of haptera secrete cementing substance. In some genera, in addition to haptera, rhizoids occur.

Podostemaceae are usually the most significant macrophytes in tropical rivers and play very important role in tropical river ecology. They are also involved in nutrient uptake and release. Their eventual use by detritus feeder is also important. They also act as substratum for diverse assemblage of epiphytic microscopic flora as well as habitat for aquatic fauna.

In Kerala, Western Ghats have an average height 950m, with the highest elevations reaching 2600m. Presence of Western Ghats combined with the North-East and South–West Monsoons provide a sub-tropical climate and seasonal flooded mountainous rivers ideal condition for Podostemaceae. Almost all 44 rivers in Kerala originate in Western Ghats and they are rich in Podostemaceae. For the present study the authors collected the members of Podostemaceae from different spots of Pooyamkutty. Pooyamkutty is a remote

village surrounded by dense rain forest of Western Ghats. Pooyamkuttu rain forest is one of the major wild life conservatory area of south India. The forest withholds many vegetation. Comprises 736 species of flowering plants including the members of Podostemaceae.

Rivers are the most polluted among tropical aquatic ecosystem. In the recent years there has been an increase in land use in the catchment area of tropical rivers, eg: for farming, roads, logging, mining etc., resulting in the introduction of pollutants from industries, agro-chemicals and mine effluents into some of the rivers. This threatens the habitat of Podostemaceae and other river biota. Philbrick and Crow (1983), Philbrick and Novelo (1995) and Novelo and Philbrick (1997) have reported on the possible loss of Podostemaceae species in North America due to human impact on the rivers these species are found. Cross Bell (1990) has provided evidence that the disappearance of 3 Podostemaceae species in downstreams of a rubber factory in Kanyakumari district was due to acid discharge from the factory into the river. Such anthropogenic impact on the survival of Podostemaceae indicates the need to conserve and protect the habitat of the members.

## II MATERIAL AND METHODS

Fresh plant material of Podostemaceae members were collected from different locations of Pooyamkuttu. The plant materials were preserved in 15% Formaldehyde at the time of collection and labeled properly. For identification and authentication of the preserved material, were observed using Binocular microscope. The photographs were taken on spots itself.

For ecological study water samples were collected from two different localities of Pooyamkuttu and water analysis was done at High tech Laboratory, Aluva, Kerala.

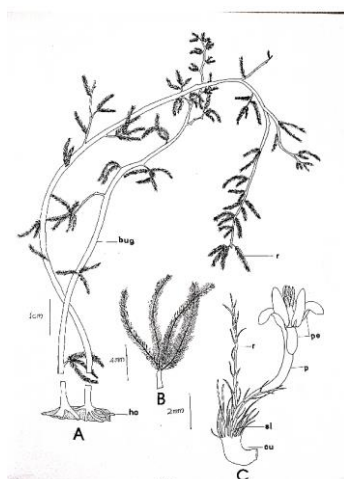
**TABLE I Collection Details of Specimen**

Sl.No.	Name of the Plant	Locality
1.	<i>Indotristicha ramosissima</i>	Pooyamkuttu-Blavana
2.	<i>Dalzellia ceylanica</i>	Pooyamkuttu-1 <sup>st</sup> spot
3.	<i>Polypleurum stylosum</i>	Pooyamkuttu-Blavana
4.	<i>Polypleurum prostratum</i>	Pooyamkuttu-Chappathu
5.	<i>Podostemum subulatum</i>	Pooyamkuttu-1 <sup>st</sup> spot
6.	<i>Zeylanidium lichenoides</i>	Pooyamkuttu-Blavana

## III RESULT AND DISCUSSION

### 1. *Indotristicha ramosissima* (Wight) van Royen

**Fig 1**

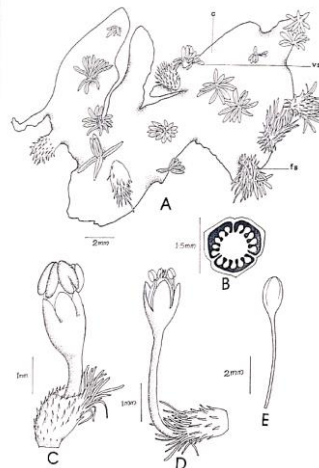


**A. Habit, B. Branch of Limited growth, C. Flower with cupule at the base**

The creeping cylindrical, attached to substratum by disci-like lobed hold fasts at the base. Hence remaining parts are free-floating. Much branched, green to brown in colour, branches of two types: branches of unlimited growth and branches of limited growth. There are many ramuli and scales at the base of the pedicel (Fig. 1: A, B & C). A leafy cupule is formed by the fusion of ramuli and scales. The pedicel is long, perianth 3-lobed. Stamen 3, equal to the length of gynoecium. Anthers ditheous and sagittate. Ovary tricarpellary, syncarpous, ovules numerous on axile placentation. Stigma trilobed hairy. Fruit is dehiscent capsule, elliptical.

**2. *Dalzellia ceylanica* (Gardn) Wight**

**Fig.2**

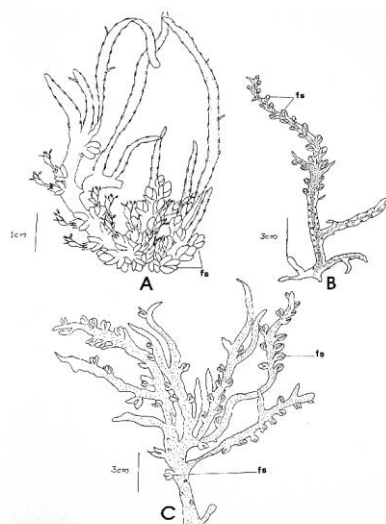


**A. Habit, B. cupule, C. single vegetative shoot D. Lobed Crust. E. Flower arising from cupule  
F. Perianth, G. Flower bud**

Submerged rheophytes with ribbon-shaped, flattened crust growing from a central point, roots absent. Vegetative and floral shoots arranged all over the surface and on the margin of the crust. The floral shoot consists of a single terminal flower with a leafy cupule at the base of the pedicel. Leaves on the cupule show morphological variations. The flowers are protected at the bud condition by a 3-lobed perianth. Stamen 3, alternating the perianth lobes longer than or equal to the length of the gynoecium. Ovary elliptical, tricarpellary, syncarpous with numerous ovules on axile placentation. Stigma 3-lobed, fruit is a dehiscent capsule.

**3. *Polypleurum stylosum* (Wight) J.B.Hall**

**Fig.3**



**Fig.4**

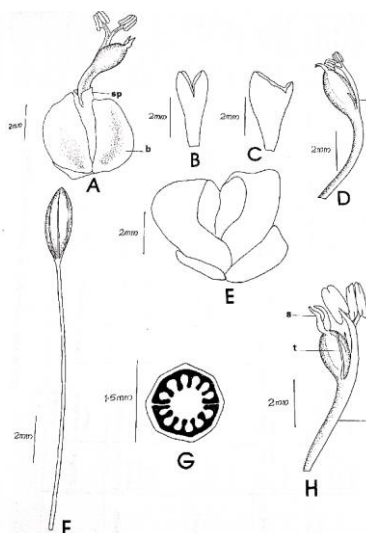


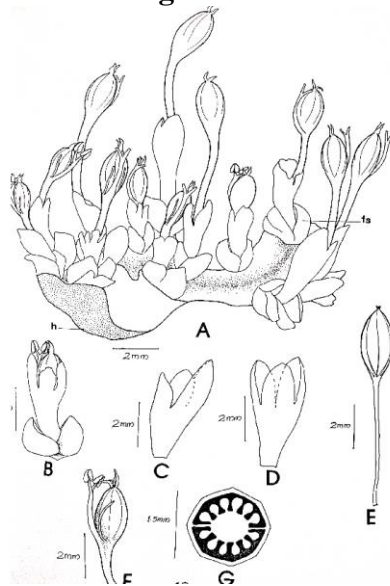
Fig 3 :A. Thallus with floral buds crowding at the base, B. Thallus with floral buds crowding at the tip, C. Floral shoots distributed all along the thallus

Fig 4: A. Floral Shoot, B. Spathella-Funnel-shaped, C. Two lobed Spathella, D. Flower-with short tepals, E. Two pairs of Bracts, F. Fruit, G. C.S. of Ovary, H. Flower-with long tepals

Thallus is ribbon-shaped, thick, attached by haptera at the base only; other portions are free-floating, vegetative and floral shoots marginal, flowers present towards the older parts of the thallus (Fig: 3). Bracts 2-6, symmetric (Fig:4 E), pedicel long, which elongates after fertilization. Spathella funnel-shaped (Fig:4 B,C), tepals 2, shorter than ovary, sometimes equal to the ovary (fig: 4 H), stamen 2, born on an andropodium. Ovary elliptical, bicarpellary, syncarpous, isolobous with numerous ovules on axile placentation. Stigma bilobed, fruits stalked, capsule isolobous.

#### 4. *Polypleurum prostratum* Mathew et Nileena

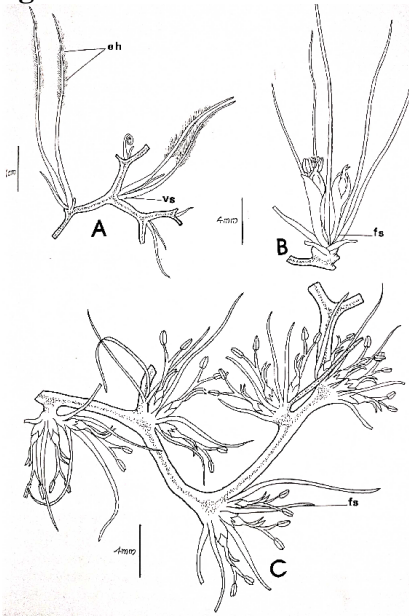
**Fig:5**



**A.**Thallus with flowers,**B.** Young flower with bracts, **C.** Assymmetrical spathella, **D.** Symmetrical Spathella,**E.** Fruit, **F:**Flower,**G.** C.S.Of Ovary

### 5. *Podostemum subulatum* Gardn.

Fig:6



- A. Thallus in vegetative stage, B. A portion of thallus having floral shoot,  
C. Thallus with clusters of floral shoots

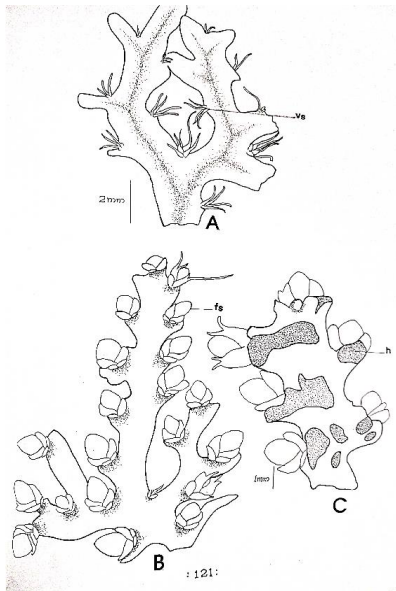
Plants are completely creeping, prostrate, narrow and thick (Fig:6) attached to rocks by haptera all along the underside as continuous or discontinuous patches. 2-4 leaves occur on each shoot. Each floral shoot terminates in a flower (Fig:6 B), protected by membraneous spathella which is erect and funnel-shaped. Pedicel of the flower long, stamen 2, monadelphous, anthers 2-lobed nearly basifixed. Tepals 2, one either side of the andropodium. Ovary nearly elliptical or ovate anisolobous, ribbed or sometimes smooth and with numerous ovules on axile placentation. Stigma subulate and curved, sometimes sickle shaped. Fruit is a capsule.

### 6. *Zeylanidium lichenoides* (Kurz) Engl.

Completely creeping herbaceous plants with ribbon-shaped thallus (Fig:7), attached to rocks very firmly by haptera. Flowers are solitary and protected by membraneous spathella which are prostrate and boat-shaped after opening. Stamen 2 on an andropodium; tepals 2 present on either side of the andropodium (Fig 8 B&C), ovary obovoid, smooth, with numerous ovules on axile placentation (Fig: 8 M), stigma bilobed. Fruit is a dehiscent capsule.

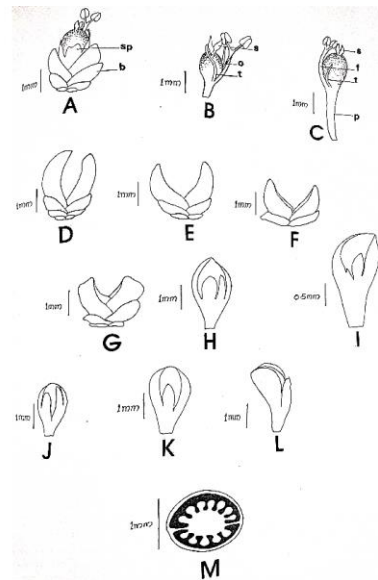


Fig:7



**Fig:7** A.Thallus with vegetative shoots,  
B.Thallus with floral shoots  
types,M.C.S.Of Ovary  
,C.Thallus –Lower surface showing haptera

Fig:8



**Fig: 8** A Floral shoot,B,C,.Flower without bract  
D-G-Bracts types.,H-L-Spathella

Members of Podostemaceae are grown in fragile ecosystem like streams and river sources and they play a key role in these ecosystem. They are otherwise called river weeds and form a supporting bed for many of the larvae, insects, small fishes etc. Hence the conservation of Podostemaceae is very importance for the maintenance of such supported fauna also.

Most of the Podostemaceae sites are affected by humane invasion and natural calamities such as land slides may cause the disappearance of these plants. When compared with other Angiosperms, members of Podostemaceae are disappearing at a faster rate. Dr. Nileena (2001), Mathew, Jagerzurn & Nileena (2001) had collected a new species of *Dalzellia gracilis* from Urulanthanni near Pooyamkutty and we could not find that species anywhere during our study. It may be disappeared due to humane invasion in that particular habitat. We could not find the plant *Polypleurum minor* also from anywhere in this locality which Mathew and Nileena had collected and published it in 2003.

Pooyamkutty location is a mosaic vegetation rich in diverse wild life. The vegetation comprises 736 species of flowering plants and 95 well known medicinal herbs. The fauna include 105 species of birds, 30 species of reptiles, 23 species of mammals and 38 species of fishes. Of these many are endemic species such as Malabar tree Nymphs, Giant Red eye Butterflies, Malabar Grey Hornbill, Leopard, Dusky striped Squirrels and Elephants. Such a vast biodiversity spot is Pooyamkutty and degradation of the natural habitat may threaten not only the Podostemaceae members but also many endemic flora and fauna.

#### IV CONCLUSIONS

The Podostemaceae members grow in high altitude river rapids and falls at the sources of rivers and streams with stony bottom. A little imbalance of the ecosystem may destruct the members of this family. They can survive only in pure, highly oxygenated flowing water. Pooyamkutty area is rich in Podostemaceae members and conservation of the ecosystem there may help to conserve these unique angiosperm members also.

**V REFERENCES**

- BELL.D.C.1990.,Biomonitoring the effect of rubber factory effluent on hillstream in Kanyakumary District;Geobios,17(516):220-222
- MATHEW C.J.,JAGERZURN,I.,NILEENA C.B.(2001),*Dalzellia gracilis*,A new species of Podostemaceae(Tristichoideae)from Kerala,India,Int.J.Plant Sci.162(4):899-909.
- NILEENAC.B.,Ph.D.Thesis submitted to Mahatma Gandhi University,Kottayam1-190
- NORMAN F.C.,1940.,A Manual of aquatic plants-Podostemaceae(River Weed Family);pp-238-239
- NOVELO R.A.&PHILBRICK C.T.,1997.,Taxonomy of Mexican Podostemaceae;Aquat.Bot.,57:275-303
- PHILBRICK C.T.&CROWG.E.,1983,The distribution of *Podostemum ceratophyllum* Michx(Podostemaceae) Rhodora,85:325-345
- PHILBRICK C.T.& NOVELO R.A.,1995.,New World Podostemaceae: Ecologicaland evolutionary enigmas;Brittonica,47:210-222
- WILLIS J.C.,1902,a, Studyof the morphology and ecology of the Podostemaceae of India and Ceylon;Ann.R.Bot.Gard.,Peradenia,1:181-250.
- WILLIS J.C.,1902,b, A revision of the Podostemaceae of India and Ceylon; Ann.R.Bot.Gard.,Peradenia,1:267-465,tab4.-38