

Intra-Specific Comparative Study of *Zeylanidium Olivacium*, Kerala, India, with Special Reference to Polymorphism

Nileena C.B.

Assistant Professor of Botany, Sree Narayana College, Cherthala, Alappuzha, Kerala

Abstract

The intra-specific variations and inter –generic similarities of the members of Podostemaceae are very peculiar. Most of the members of this family show polymorphism especially *Zeylanidium olivacium*. To understand the real relationship between the members, a detailed study of the species was done. The comparison was done between specimen collected from 5 different localities.

INTRODUCTION

Podostemaceae is the largest family of submerged flowering plants, commonly known as the “river weed family”. The names of many species in this family reflect their ‘non-angiospermous’ appearance: eg., *Apinagia fucooides* (Mart. & Zucc.) Tul. (resembling the brown alga *Fucus*). It comprises 48 genera and ca. 270 species (Grubert, 1975, 1991; Cook, 1990; Mohan Ram & Sehgal, 1992; Philbrick & Novelo, 1993, 1995).

Podostemaceae is a very interesting group of aquatic angiosperms with unlimited scope for investigation. The presence of Western Ghats, combined with the North-East and South-West monsoons, provide a subtropical climate and seasonally flooded mountainous rivers – ideal condition for Podostemaceae. Hence most of the 44 rivers in Kerala are rich in Podostemaceae members. Many of the sites which had profuse growth of different genera of the family show poor growth of the members recently.

Many of the members of this family show the phenomenon of polymorphism and degree of polymorphism can be determined only after a thorough investigation of different species. Jager Zorn (2000a & b) studied the developmental morphology of *Zeylanidium olivaceum*. Nature of the crust is mostly evidenced by the existence of fringe of root cap, lack of leaves, presence of an inner meristem responsible for the growth of the root and root cap cells and the endogenous development of root-borne (secondary) shoots. The main aim of the present investigation was the study of the morphology of *Zeylanidium olivaceum* collected from different localities.

MATERIAL AND METHODS

Most of the Podostemaceae members were present in the river and stream sources and all these locations appear flooded during the monsoon seasons. Almost all Podostemaceae members were in vegetative stage. The members were in blooming during December to January, when the rivers started drying, during March to May the plants become exposed fully due to intense sunlight and hot weather and found them in fruiting stage.

The collected materials were preserved in 15% formaldehyde for morphological observations. Each material was given separate collection number. Field diaries showing details such as collection number, date of collection, name of plant, family, Locality, altitude, habit, habitat, important notes, details of identification and confirmation were prepared. The fixed specimens were observed under Carlseize binocular dissection microscope. A compound microscope was also used occasionally. Drawings of the examined specimens were prepared and the measurements were taken by metric scale. These drawings were traced on gateway paper using Rotring vatrient pens (thickness: 0.1, 0.2, 0.4, 0.6 and 1.00mm) and black drawing ink (Rotring).

TABLE I : Showing Details of Collection of *Zeylanidium olivaceum*

Sl.No.	Locality
1.	Cheeyappara water falls, Idukki
2.	Adimaly water falls, Idukki
3.	Valara water falls, Idukki
4.	Attikalam, Idukki
5.	Vellathooval, Idukki

RESULTS AND DISCUSSION

Zeylanidium olivaceum (Gardner) Engler

Submerged, rheophytic herbaceous plants seen on the rocks in water falls. Plant body crustaceous, sometimes leathery, pink to dark green in colour, attached very firmly on the substratum by haptera. Vegetative shoots scattered on the thallus (plant body). Two types of shoots present; shoot with stalk-primary shoots (Willis, 1902) and shoot without stalk (secondary shoot). The stalked shoots are soft to woody, sometimes branched, 3-8.5cm long; each with crown of leaves, 25-260 in number. The other type of shoots are prostrate, each with 2-6, rarely 9 distichous leaves, which may sometimes hairy.

Almost all prostrate shoots later transformed into floral shoots, while stalked shoots only occasionally become floriferous. The sheathing bases of the leaves become bracts, 4-8 in number. Flower buds are covered by membranous spathe which are boat-shaped on opening, 2.5-4mm long.

Flowers terminal, solitary, pedicellate and erect. Pedicel 1-4.5 mm long. Stamen 2, on an andropodium; 1.5-4mm long; elongates after anthesis. Anthers 2-lobed, nearly basifixed. Tepals 2; 1-2mm long, shorter than the ovary. Ovary nearly elliptical 1.5-2.5mm long, smooth, anisolobous with numerous ovules on axile placentation. Stigma bilobed 0.5-1mm long, conical to obcuneate, sessile to nearly sessile, dark brown in colour.

Fruit is a capsule, nearly elliptical, 1.5-3mm long, anisolobous, 2-valved, each valve with 3-ribs, fruit stalk 4-6mm long.

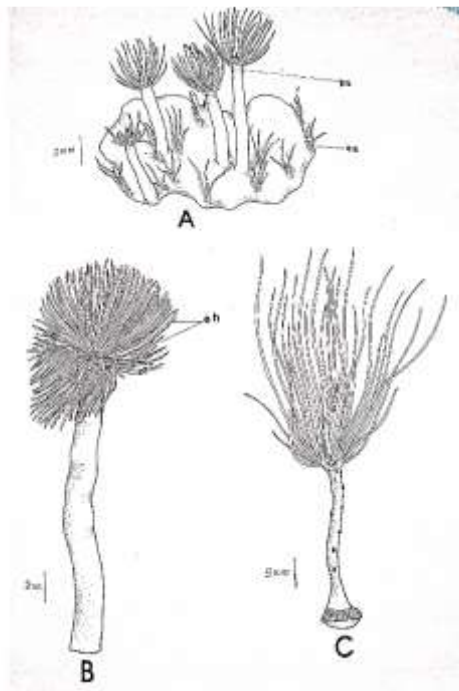


Figure: 1 A-Thallus with primary and secondary shoots
 B-Primary (Stalked) shoot; C-Pri.shoot with branch

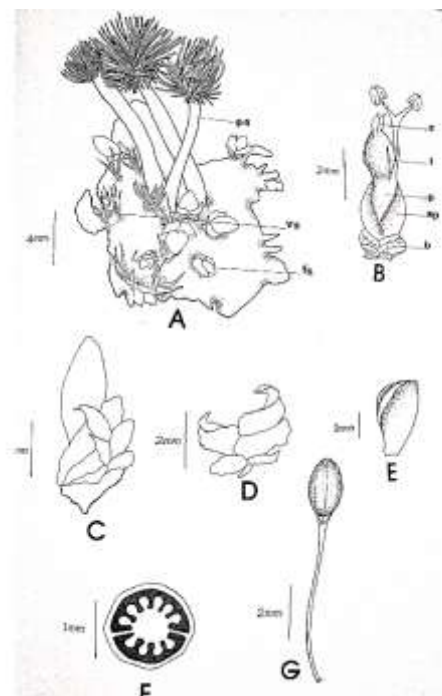


Figure: 2 A- Thallus with primary and floral shoots
 B-Flower, C-Flower bud, D-Bracts, E-Spathella,
 F-Ovary C.S., G-Fruit

Zeylanidium olivacium was collected from 5 different localities. The specimen from different localities show much morphological variations. They vary in the following characters: - texture of the thallus, colour of the thallus and other portions, size of the primary shoot, texture of the primary shoots, number of

leaves on the primary shoots, presence of hairs on the leaves, nature of the bracts, length of the tepals, length of the stamen and length of the fruit-stalk etc.

The specimen from Cheeyappara water falls are very small when compared to specimen from other localities. The specimen from Cheeyappara show primary shoots which are soft in texture with 80-260 leaves on each stalk. They occasionally bear flowers among the crown of leaves. The plant parts are yellowish green in colour and the leaves are hairy.

The specimen collected from Adimaly and Periavurai are the biggest with a woody texture. The primary shoots are 1.8-6.8cm long and there are 30-100 leaves present on each stalk. The plant parts are deep green coloured. The leaves are non-hairy.

The specimen from Valara are big, but not woody. The primary shoots are 3-8.5cm long, with a crown of 25-105 leaves. The stalks of the primary shoots are brown coloured and other portions of the plant are light green coloured. The leaves are non-hairy.

CONCLUSIONS

This species shows polymorphism. There are distinct variations in the vegetative features such as size and texture of the plant parts, colour of the plants, number of leaves on the primary shoot, presence or absence of flowers on the primary shoot, hairy or non-hairy leaves, nature of the bracts etc. Therefore, the author proposes two types for the species *Zeylanidium olivacium*. These are: **Type I comprises the plants collected from Cheeyappara water falls and **Type II** Those collected from all other localities.**

Key to the Types of *Zeylanidium olivacium*

Plants are small, occasionally primary shoot bears flowers, plant parts are soft in texture, bear 80-260 leaves on the stalked shoot, leaves hairy.....

.....**Typ I**

Plants are big, primary shoots do not bear flowers, plant parts are hard and woody, 25-105 leaves on the stalked shoot, leaves not hairy.....

.....**Type II**

REFERENCES

1. **COOK, C.D.K.** 1990, Family Podostemaceae in Aquatic Plant Book, p.171-191 SPB Academic Publishing Co. The Hague, the Netherlands.
2. **GRUBERT, M.**, 1975. Okologie extrem adaptierter Blütenpflanzen tropischer Wasserfälle. Biologie in unserer Zeit, 5 : 18-25
3. **GRUBERT, M.**, 1991. Ecología de fanerógama de saltos tropicales adaptadas en forma extrema. Natura (Caracas), 91 : 54-61
4. **JAGER ZURN I.**, 2000a. Crustose root and root-borne shoots of *Zeylanidium olivacium* (Podostemaceae-Podostemoideae) Part VI of the series "Morphology of Podostemaceae", Flora, 195 : 61-62
5. **JAGER ZURN I.**, 2000 b. Developmental morphology of root and root-borne shoots of *Podostemum subulatum* as compared with *Zeylanidium olivacium* (Podostemaceae-Podostemoideae) Part VII of the series "Morphology of Podostemaceae", Plant Syst. Evol., 220 : 55-67
6. **MOHAN RAM & SEHGAL**, 1992. Podostemaceae –the strange family of angiosperms, Palaeobotanist; 41: 192-197

7. **PHILBRICK & NOVELO** 1993.1995A fascinating family of aquatic flowering plants.Aquaphyte, 13: 1-7
8. **PHILBRICK & NOVELO**,1995.New world Podostemaceae : Ecological and Evolutionary enigmas; Brittonica,47 : 210-222
9. **WILLIS, J.C.**,1902. Studies in the morphology and ecology of the Podostemaceae of India and Ceylon; Ann.R.Bot.Gard.,Peradeniya, 1 : 181-250