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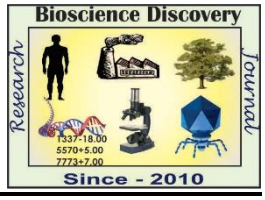

Nodal anatomy in some species of *Rotala* L. (Lythraceae)

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Abstract

The vascular organization of the node in nine species of *Rotala* has been investigated. The leaves were generally opposite, opposite decussate and sessile in all studied plants. The serial sections of node have taken and these sections were stained either in saffranin or light green combination. The foliar nodes were unilacunar one traced noted in all species of *Rotala*. The variations in arch shaped median trace and vasculature of nodal regions can be used for differentiation.

INTRODUCTION

The present paper deals with details of nodal structures in nine species of genus *Rotala* belonging to family Lythraceae. The study of nodal organization and vasculature is widely employed in the systematic and phylogenetic studies earlier by Sinnott (1914) recorded unilacunar one traced node in Scrophulariceae. Studies of Ozenda (1969), Dickson (1969), Takhtajan (1969) reveals that the tri-multilacunar type with double trace at the median gap as the primitive nodal type from this other type has been derived. According to Cronquist (1981) also indicates unilacunar node with single trace in family Lythraceae. The foliar nodes are unilacunar one traced noted in all species of *Rotala*. The variations in arc shaped median trace and vasculature of nodal regions can be used for differentiation. There are few families with unilacunar nodes which show variation in the vasculatures.

MATERIALS AND METHODS

The plant material of nine species of *Rotala* like *Rotala densiflora* (Roth.ex.R&S) Kohene, *Rotala fimbriata* (Wight), *Rotala floribunda* (Wight) Kohene, *Rotala indica* (Willd) Kohene, *Rotala malampuzhensis* R.Vasudevan Nair, *Rotala occultiflora* Kohene, *Rotala rotundifolia* (Buch-Ham-ex.D.Don) Kohene, *Rotala rosea* (Poir) cook, *Rotala serpyllifolia* (Roth) Bremek are collected from various regions such as Kannad .Mahismal, Kondaibari (Navapur), Kolhapur, Nanded etc.They were fixed in FAA and are preserved in 70% alcohol. Free hand serial sections were taken and slides prepared by following usual methods of dehydration, clearing and embedding in paraffin wax. These sections were stained either in saffranin or light green combination.

Observation

1) ***Rotala densiflora*:** The leaves are opposite decussate and sessile. The axial cylinder bears median trace which is an arc-shaped in structure. Later on, it extends into the leaf (Figs. 1a, b, c, d) the node is unilacunar one-traced.
2) ***Rotala fimbriata*:** The leaves are developed at a node in opposite decussate manner which are sessile. A prominent median trace emerges out from the stellar structure leaving behind a gap. The two traces are derived next from stellar structure which later on unite to form a ring like vascular structure, for an axillary bud (Figs.2 e, f, g, h, i) the gap is then filled up.

The median trace extends into the leaf. The node is unilacunar one-traced.

3) ***Rotala floribunda*:** In this plant, the phyllotaxy is opposite decussate and leaves are sessile. At the nodal region from the axial vascular cylinder a prominent arc-shaped median trace emerges out leaving behind a gap (Figs.3 a, b, c, d) the median trace enters into the leaf without splitting (Fig. 3e). The node is unilacunar one-traced.
4) ***Rotala indica*:** The plant develops the leaves at each node in an opposite decussate manner. Below the nodal region vascular structure occurs in a ring. The vascular cylinder sends out a median trace (Figs.4 f, g, h, i) which extends into the leaves. The node is unilacunar one-traced.
5) ***Rotala malampuzhensis*:** In this plant the phyllotaxy is opposite. The axial vascular cylinder bears a median trace. This is an arc-shaped leaving behind a gap. It then extends into the leaf (Figs. 5 a, b, c) the node is unilacunar one-traced.
6) ***Rotala occultiflora*:** The arrangement of leaves at the nodal region is opposite and whorled. The node has well developed vascular cylinder, from which a median trace is emerged out (Figs. 6 d, e, f) which extends into the leaf. The trace is an arc-shaped. The node unilacunar one-traced.
7) ***Rotala rotundifolia*:** The leaves are opposite decussate in manner at nodal region, which are heterophyllous. The vascular cylinder bears a median trace (Figs.7 a, b, c, d) which later on extends into the leaf. The trace is arc-shaped and prominent. The node is unilacunar one-traced.
8) ***Rotala rosea*:** The phyllotaxy is opposite decussate at the nodal region. An arc-shaped median trace is given out from the axial stele (Figs. 8 e, f, g, h) which extends into the leaf. The node is unilacunar one-traced.
9) ***Rotala serpyllifolia*:** At each node two leaves are developed in opposite decussate phyllotaxy. The node has vascular tissue in the form of ring. The median trace emerges out leaving behind a gap (Figs. 9 a, b, c, d) the two traces are then, derived from the stellar part. These two traces unite to form a vascular structure for an axillary bud (Fig. 9 d). The median trace enters into the leaf. The node is unilacunar one-traced. The present study reveals that, all the studied plants have unilacunar one traced nodal structures.

Discussion

The present study brings out some interesting features while exhibiting a greater degree of uniformity in the studied plants. The node shows only one major type of category that is unilacunar one traced structures. The unilacunar node with an arc shaped trace occurs in all studied plant species.

The occurrence of axillary nodes is noted in some species of *Rotala.* Generally, a solitary bud is developing in the axils of each leaf. The axillary buds develop into a branch, flowers or inflorescence. From the axial stele the vascular supply to each axillary bud is derived directly. Generally, the leaf trace is followed by two branched traces which unite into a small trace which enters into the axillary buds. In all species the node is unilacunar-single traced structure is recorded.

Sinnott (1914) in his survey on the nodal organization of flowering plants has advocated that, the Lythraceae posses a unilacunar single traced node. Cronquist (1981) has also indicates unilacunar nodes with single trace. There are few families with unilacunar nodes which show variations. The nodal anatomy in Verbenaceae reveals that the unilacunar node with one, two or many traced conditions. Marsden and Bailey (1955), Esau (1965), Shah et.al (1972), Banger (2002) while attempting the study on large number of taxa, Sinnott (1914) emphasized the importance of the leaf trace and leaf gap in the systematic angiosperms.

Sinnott (1914) reported three basic types of nodes for angiosperms and out of these he considered that three traced condition is primitive and unilacunar, the multilacunar type derived from it by reduction or amplification of the original bundles and their gaps. Ozenda (1949) on the basis of nodal anatomy of the magnoliales considered the multilacunar node is primitive type the trilacunar and unilacunar derived from it by reduction. Dickson (1969) on the basis of her studies on nodal pattern of Dilleniaceae contradicted the views of Ozenda (1949), Takhtajan (1969) postulated tri-multilacunar type with a double trace at the median gap as the primitive nodal type and form this other type has been derived. The present study reveals that all the studied taxa shows unilacunar single traced nodal vasculature.

On the basis of present study and that of other Sutar (1997), Sutar and Vaikos (1998), Banger (2002) it may presume that, either the arc is result of fusion of several traces into one broad arc or it get amplified to give many branches.

Canright (1953), Philson and Philson (1968) are of the opinion that the arc is derived as a result of ontogenetic and phylogenetic fusion of several traces. Visualizing the various suggestions, it could be conceived that in the family Lythraceae too nodal evolution must have evolved a reduction process. Such some nodal characters are useful for the taxonomic delineation of species.

Figures: Abbreviation used (AB-Axillary bud.)

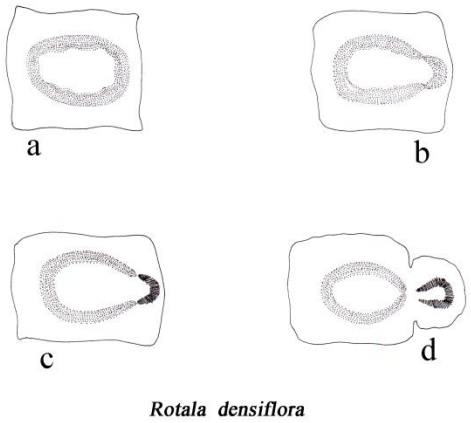

Fig.1 a, b, c, d. Nodal anatomy of *R.densiflora*

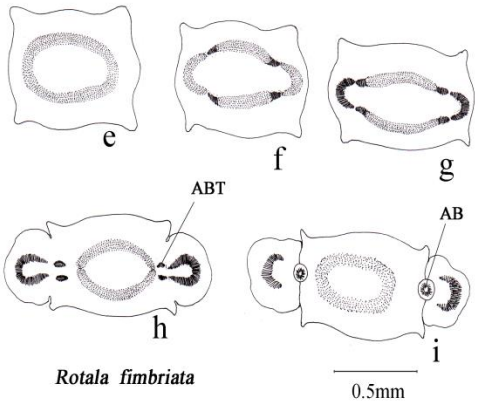

Fig.2 e, f, g, h, i. Nodal anatomy of *R.fimbriata*

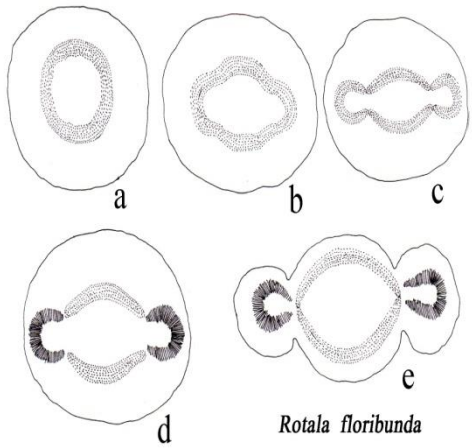

Fig.3 a, b, c, d, e. Nodal anatomy of *R.floribunda*

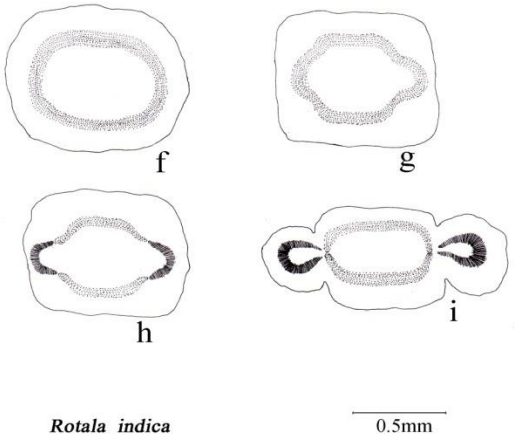

Fig.4 f, g, h, i .Nodal anatomy of R. *indica*

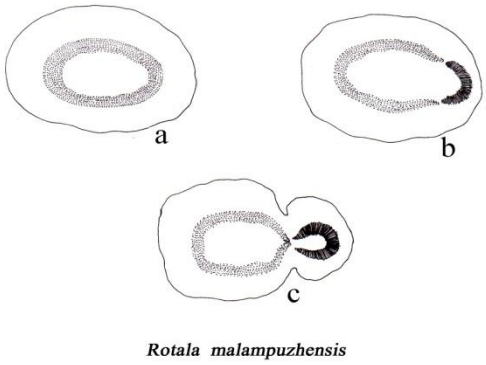

Fig.5 a, b, c. Nodal anatomy of *R.malampuzhensis*

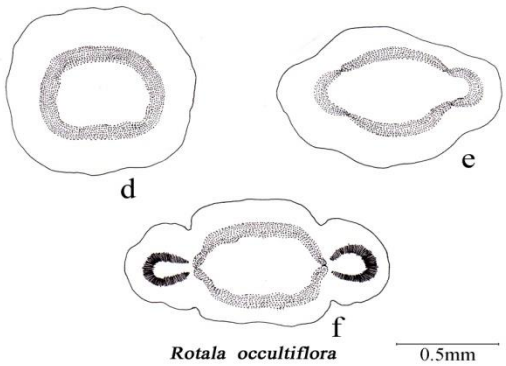

Fig.6 d, e, f. Nodal anatomy of *R.occultiflora*

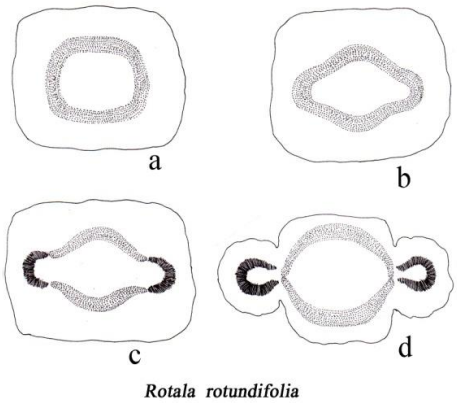

Fig.7 a, b, c, d. Nodal anatomy of *R.rotundifolia*

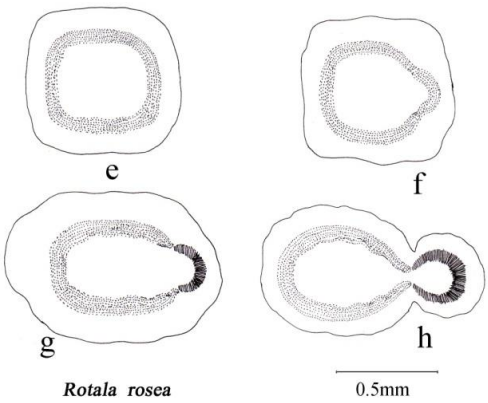

Fig.8 e, f, g, h. Nodal anatomy of *R.rosea*

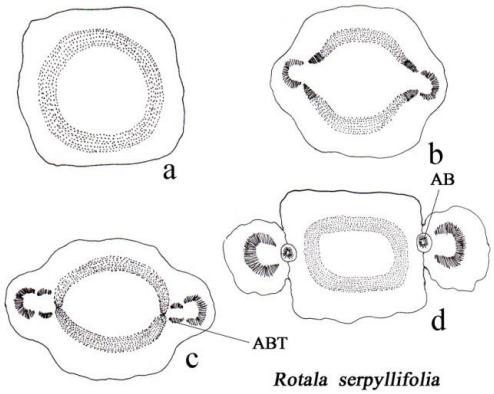

Fig. 9 a, b, c, d. Nodal anatomy of R. *serpyllifolia*

REFERENCES

Banger MA, 2002. Morphological studies in some Verbenaceae *Ph. D Thesis. Dr. Babasaheb Ambedkar. Marathwada. University,* Aurangabad.

Cronquist A, 1981. An integrated system of classification of flowering plants, Columbia University Press, New York.

Canright JE, 1955. The comparative morphology and relationship of the Magnoliaceae IV, Wood and nodal anatomy *J. Arnold Arbor.*, **36.**119-140

Dickison WC, 1969. Comparative morphological studies in Dilleniaceae IV Anatomy of the node and visualization of the leaf *J. Arnold. Arbor. Harv. Univ*., **50**: 384-410.

Esau K, 1965. Plant Anatomy Jhan willey and Sons, New York.

Marsden MPF and IW Bailey, 1955. A fourth type of nodal anatomy in Dicots illustrated by *Clerodendron trichotomum* Thumb. *J. Arnold Horv. Univ*., **36**-1-50.

Ozenda, 1949. Recherches Surv. Les Dicotyledonous apocarpiques. pub. Lab. I Ecole. Normal supesieure Ser. Bio. Fase-II, Paris.

Philson WR and Philson MN, 1968. Diverse nodal types in Rhododendron *J. Arnold. Arb. Harv. University*, **49**: 193-224.

Sinnott EW, 1914. Investigation on the phylogeny of the Angiosperms I. The anatomy of the node as an aid in the classification of Angiosperms *Amer. Jou. Bot-I* 303-332.

Shah JJ, Patel JD and Kothari IL, 1972. Vascular supply of axillary buds in some dicotyledonous. Adv. Plant Morpho. (Prof.Puri.Commomeration of ed. Y.S. Murty ,B.N,Joshi,H.V.Mohan Ram and T.M. Varghese. Satish prakashan Meerut, pp 65-75.

Sutar, 1997. The morphological studies in some Tubiflorae: The Scrophulariceae *Ph.D.Thesis Dr.B.A.Marathwada University*, Aurangabad.

Sutar and Vaikos, 1998. Application of nodal characters in the studies of Scrophulariceae *J. Indian Bot.Soc*. Vol.**77.**39-42.

Takhtajan AL, 1969. Flowering plants: Origin and dispersal. English Translation C. Jeffery, Oliver and Byod.Endinburgh.

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