J. Phytol. Res. **13** (2) : 187-189, 2000

STOMATAL ONTOGENY IN SOME LYTHRACEAE

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The structure and development of stomata in the leaves of nine species of Lythraceae were studied. Usually anomocytic and haplocytic stomata were observed. Paracytic and tetracytic stomata were reported only in *Sonneratia apetala* which supports its separation from Lythraceae. Contiguous stomata and stoma with a single guard cells were also observred.

Keywords : Lythraceae; Stomata.

The family Lythraceae have 25 genera and 550 species[1]. The stomatal study in the plants of this family is scanty. In the present work the structure and development of the stomata in the leaves of nine species of Lythraceae viz., *Ammannia baccifera* L., *Lagerstroemia indica* L., *L. parviflora* Roxb., *L. speciosa* (L.) Pers., *Lawsonia inermis* L., *Punica granatum* L., *Rotala serpylifolia* (Roth) Bremek., *Sonneratia apetala* Buch-Ham. and *Woodfordia floribunda* Salisb. were studied.

The young and old leaves were collected from the plants growing in various regions of South Gujarat, India and fixed in FAA[2]. The thin peelings were separated from adaxial and abaxial surface of leaves with the help of pointed forceps and stained with Delafield's haematoxyline and mounted in Glycerine jelly[2].

The leaves of *Ammannia baccifera, Lowsonia innermis, Rotala serpylifolia* and *Sonneratia apetala* were amphistomatic and of rest of the species were hypostomatic.

Anomocytic (Fig. 1A) and haplocytic stomata (Fig. 1B,C) were more common and present in all the species studied. Paracytic (Fig. 1D) and tetracytic stomata (Fig. 1E) were not frequent and reported only in *Sonneratia apetala.*

Development of stomata : A meristemoid was a deeply stained cell with a prominent nucleus and was smaller than the surrounding epidermal cells. It was tetrangular in *Lagerstroemia indica, L. parviflora, L. speciosa* and *Sonneratia apetala* (Fig. 1F); triangular in *Woodfordia floribunda* (Fig. 1G); and both in *Ammannia baccifera, Lowsonia innermis, Punica granatum* and *Rotala serpylifolia.*

Anomocytic stomata : A meristemoid directly functions as a guard cell mother cell which divides to produce two cells of almost equal size (Fig. 1H). Latter differentiate as the guard cells which were surrounded by 3-4 epidermal cells (Fig. 1A).

Haplocytic stomata : A meristemoid divides only twice to produce one subsidiary cell and two guard cells. Both divisions were at right angle to each other so that position of the subsidiary cell was polar (Fig. 11J). Guard cells were surrounded by one subsidiary cell and a few epidermal cells.

Some times both the divisions of meristemoid leading to the formation of haplocytic stoma were parallel to each other so that the subsidiary cell was lateral in position (Fig. 1C,K). Rarely the haplocytic stomata with a subsidiary cell partly lateral and partly polar in position were also observed (Fig. 1L.).

Paracytic stomata : A meristemoid divides twice to form two lateral subsidiary cells and a small central cell (Fig. 1M). The central cell functions as a guard cell mother cell and divides to produce two cells of equal size which differentiate as guard cells (Fig. 1N). A stoma with two laterally placed subsidiary cells was produced (Fig. 1D).

Tetracytic stomata : This type of stomata always develops from a tetrangular meristemoid. A meristemoid divides four times to form four subsidiary cells and a small central cell (Fig. 1O). Each division occurs at right angle to the previous one.

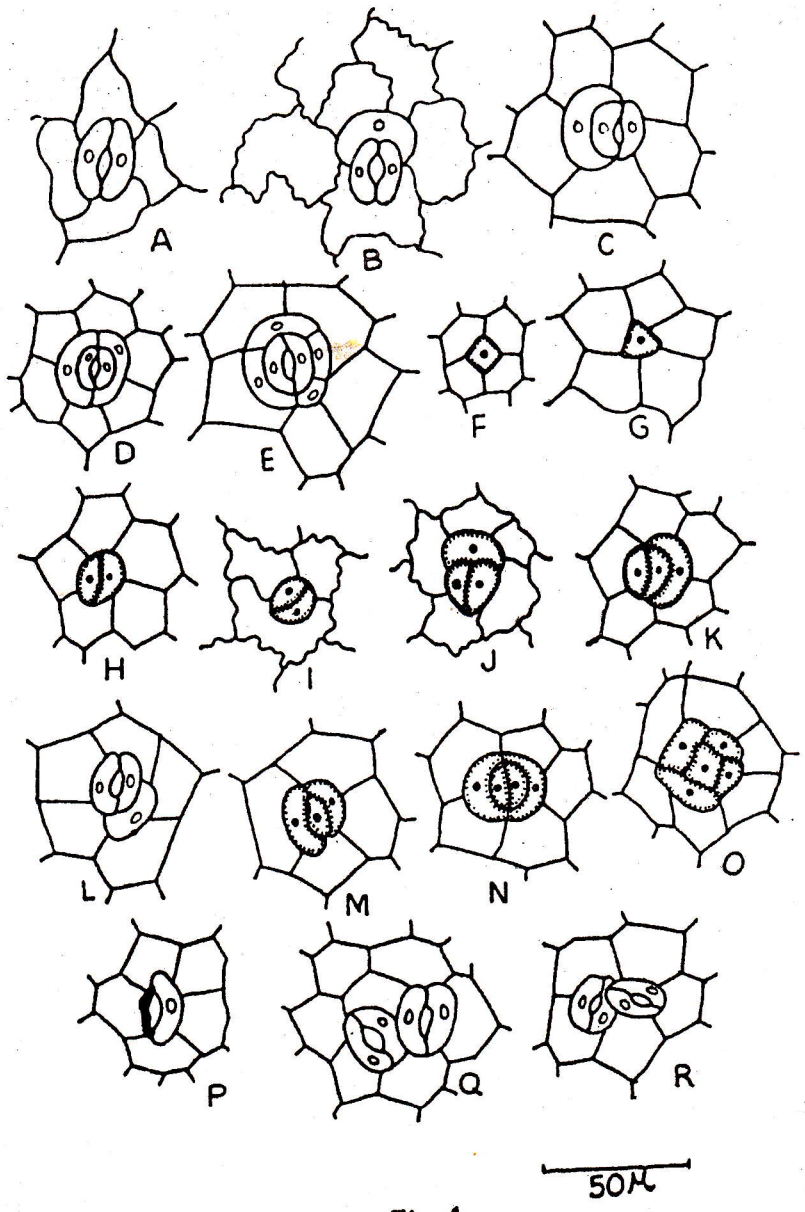

Fig.1

Fig. 1A-R. Surface view of different types of stomata and their developmental stages. A. Anomocytic stomata; B.C.L. Haplocytic stomata; D. Paracytic stomata; E. Tetracytic stomata; F, G. Meristemoid; H. Developmental stage of anomocytic stomata; I,J,K. Developmental stages of haplocytic stomata; M,N. Developmental stages of paracytic stomata; O. Developmental stage of tetracytic stomata; P. A stoma with a single guard cell; Q. Juxtaposed contiguous stomata; R. Contiguous stomata at right angle to each other. (A, *Lagerstromia indica*; B, I, J, *Ammania baccifera*; C,H,K,L, *Lagerstromia parviflora*; D-F, M-P, *Sonneratia apetala*; G,Q,R, *Woodfordia floribunda*.)

The central cell divides to form two guard cells which were surrounded by four subsidiary cells (Fig. 1E).

Stoma with a single guard cell : The stoma with a single guard cell was observed except in *Woodfordia floribunda.* Such type of stoma was uncommon and was formed due to the degeneration of one of the guard cells. The degenerating guard cell showed increased vacuolation, deformation and collapse probably due to loss of turgidity (Fig. 1P).

Contiguous stomata : Juxtaposed contiguous stomata were observed in *Ammannia baccifera, Lagerstroemia indica, L. speciosa* and *Woodfordia floribunda* (Fig. 1Q). Rarely contiguous stomata arranged at right angle to each other were also present in *Woodfordia floribunda* (Fig. 1R).

According to Metcalfe and Chalk[3] only anomocytic stomata were present in the Lythraceae. The taxa under investigation showed haplocytic, paracytic and tetracytic stomata in addition to anomocytic stomata.

Ontogenetic study showed that the anomocytic stomata were perigenous. The haplocytic, tetracytic and paracytic stomata were mesogenous as in these types the guard cells and subsidiary cells were derived from the same meristemoid[4-5].

Sonneratia apetala differed from other genera of Lythraceae by the presence of paracytic and tetracytic stomata. This may support Hutchinsion[6] for the separation of *Sonneratia* from Lythraceae into Sonneratiaceae.

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