

STOMATAL VARIATIONS ON THE LEAF EPIDERMIS OF *RICINUS COMMUNIS* L.

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Considerable variability existed in the organization of stomatal apparatus of *Ricinus communis* L., a monotypic genus of Euphorbiaceae. The stomata principally showed paracytic organization. Production of additional subsidiary cells and the cuticular striations were also seen.

Keywords : Stomatal apparatus; *Ricinus communis*.

Ricinus communis L. a monotypic genus, is an annual or perennial bush or even grow up to the height of 16 metres. Though a few reports have appeared on the organizations and diversities of structures in the family Euphorbiaceae (Metcalf and Chalk, 1950; Paliwal and Kakkar, 1969; Rao and Raju, 1975) but no attempt has ever been made to study the epidermal system of the family and *R. communis* in particular. Present communication deals with the study of epidermal system especially the stomatal variations in *R. communis* grown under different environmental conditions in and around Jammu.

Material for the present study was collected from the Gandhinagar locality of Jammu. Epidermal peels from the mature leaves were taken,

stained with 1% saffranin and mounted in glycerine jelly. Camera lucida drawings were drawn and the materials are deposited with the Department of Biosciences, University of Jammu.

The leaves of *R. communis* L. were amphistomatic. The abaxial surface had small isodiametric cells with straight walls. However, the cells of adaxial side were with thick, shining, undulated anticlinal walls. Epidermal cells on both the surface had distinct protoplasm containing prominent oil globules. There were distinct cuticular striations on the cells.

The principal type of stomata was paracytic type. However, other than the paracytic type; anomocytic

anisocytic types were also seen in the same peel for both the leaf surfaces (Figs. 1, 2, 4, 10, 12). Size of the stomata is almost equal on both the surfaces while the distribution of stomata per unit area on both surfaces of the leaf was variable, being more on lower surface (Table 1). On the upper surface, one of the stomatal complex appeared to be flattened from one side and stretched on the other. With the result epidermal cell from the surrounding appeared to be positioning in the space provided by this process. Thus resulting in a progress towards the change in stomatal type (Figs. 8, 9). On the lower surface it was seen that the upper tangential wall of the cell got pushed down and fused with the lower wall, thus dividing the cell into two unequal parts. In this way, the paracytic type of stomatal complex appeared as anisocytic type (Figs. 3, 6). Other than these variations, some abnormalities on the upper surface had been

marked. At some places the epidermal cells divided in such a way that they appeared as false embryo and stained darker (Fig. 11). Some places were marked with arrested development of stomata. (Figs. 5, 6), however, some of the stomata were only with guard cell (Fig. 1). The amplitude of abnormalities on the lower surface was very little except at some places the subsidiary cell of anomocytic type stomata were further seen to divide anticlinally resulting into a jacket of cells around the stomata (Fig. 7, 13).

Family Euphorbiaceae is known for the diversity in vegetative, floral anatomical, embryological and cytological characters (Rao and Raju, 1975). According to Metcalf and Chalk (1950) and Paliwal and Kakkar (1969) anomocytic, anisocytic and paracytic types of stomata are reported in the family Euphorbiaceae. Our findings on *R. communis* L. are also in confirmity and support their

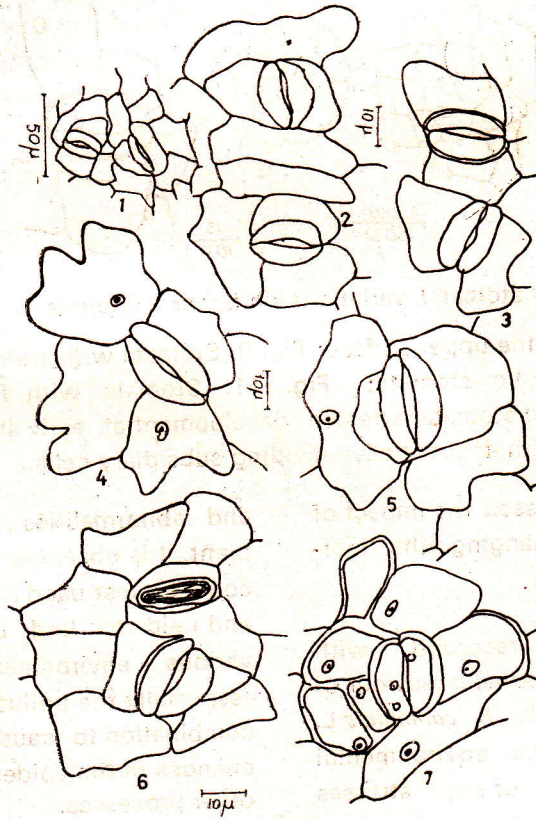
Table 1. Variability in the epidermal characters of leaves of *Ricinus communis* L.

Leaf surface	Stomatal frequency/ (sq. cm.)	Stomatal Index	Stomatal Size	
			Length (μ)	Breadth (μ)
Lower*	47	18.09	27.0	15.0
Upper	29	3.6	26.0	15.5

*Each reading represents mean of 100 reading/microscopic field.

reports. Paliwal (1965) and Rao and Raju (1975) also reported such variations in the types of stomata and abnormalities in various families. No body had ever mentioned the causes of variability and abnormal behaviour;

and abnormalities in the epidermis of the Morphactin and Nigera treated plants. They even reported such changes with the treatment of ethyl hydrogen propyl phosphonate on *Vicia faba* (Paliwal *et al.*, 1974).



Figs. 1-7. Showing stomatal variations in lower epidermis.

Fig. 1. Stomata, lower surface, stomata with one guard cell; **Fig. 2.** Paracytic and anisocytic stomata; **Fig. 3.** Twin stomatal apparatus; **Fig. 4.** Anomocytic stomata with undulated cells; **Fig. 5.** Stomata with unequal subsidiary cells; **Fig. 6.** Stomata with adpressed under wall; **Fig. 7.** Stomata with tangentially divided subsidiary cells.

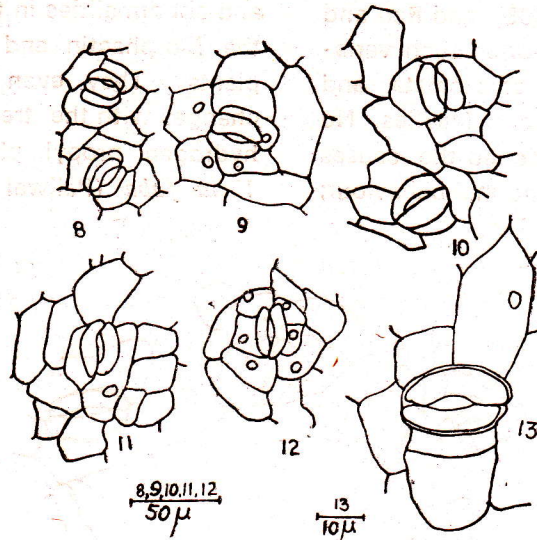


Fig. 8-14. Showing stomatal variations on upper epidermis.

Fig. 8. Stomata on the upper surface; Fig. 9. Stomata with stretched guard cells; Fig. 10. Anomocytic stomata; Fig. 11. Stomata with false embryoids; Fig. 12. Anomocytic stomata, arrested development at early stages; Fig. 13. Stomata with tangentially dividing subsidiary cells.

Sharma (1977) stressed the impact of environment in changing the morphological features.

Observations recorded with regards to the abnormal behaviour of stomatal apparatus in *R. communis* L. are also due to the environmental stresses. The effect of such stresses was more on the upper epidermis as compared to lower one, since the upper surface of the leaf is in direct contact thus prone to higher percentage of variations. Arora *et al.* (1982) also ascertained the role played by water stress in changing the stomatal behaviour. In view of the variations

and abnormalities met within this plant, it is observed that the material could be rest used both in laboratory and field to find out the effect of various environmental parameter (especially the pollutants) in different combination to cause morphological changes in the epidermal system and other processes.

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