

STUDIES ON DERMAL ANATOMY OF SOME TERRICOLOUS ORCHIDS FROM SAHYADRI (WESTERN GHATS).

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Key words : Anomocytic, terricolous, orchid.

Present paper deals with the study on dermal anatomy of six terricolous as well as saxicolous orchids from Khandala (Sahyadri - Western ghat). Trichomes were present in *Habenaria rariflora* A. Rich. and *Spathoglottis plicata* Blume.

INTRODUCTION

Habitat of the orchids varies from terricolous, corticolous as well as saxicolous and some of these also possess lignicolous habitat. Depending upon the morphological characters, taxonomic treatment were proposed by research workers (Dressler and Dodson, 1960)

The commonly applied parameters are cytogenetical, embryological, phytochemical, phytogeographical as well as palynological studies under SEM. Study of Dermal characters of leaves was based on distribution and frequency of stomata. (Kaushik, 1983). Dermal anatomy of Western Himalayan Orchids is also well studied. (Vij. et al. 1991). Hence the orchid systematics needs through revision using parameters other than morphotaxonomy. Therefore preliminary attempt was made on the study of stomata and related features of leaf epidermis in six terricolous taxa namely, *Habenaria grandifloriformis* Blatt. and *McCann.*, *H. rariflora* A. Rich., *H. gibsonii* Hook. F., *H. heyneana* Lindl., *Pecteilis susannae* (L.) Rafin., and *Spathoglottis plicata* Blume.

MATERIAL AND METHODS

Materials related to the study of stomata was studied by Peeling method of leaves. Mature leaves were used to study the dermal characters. The method suggested for grasses by Metcalfe (1960) and for Orchids by Williams (1975) was adopted in present investigation. The leaves were scrapped until only the epidermis remained. The epidermis was mounted in mounting medium (glycerine and alcohol, 1: 1). The measurements were made with the help of a standardized micrometer. Scale was calculated with the help of ocular and stage micrometer. Drawings were made with the help of a camera lucida. Stomatal Index was calculated by adopting standard formula.

OBSERVATIONS

1. *Habenaria grandifloriformis* Blatter and McCann. Bulbous, herb, with single leaf closely attached to the ground with white raceme at Khandala (near lake) & common all over the Western ghats, usually dwelling in monsoon period. Leaves : 1-2 More or less spreading, fleshy, ovate, subrotund or apiculate at the apex, 2.5-5 cms, hypostomatic.

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Cells polygonal with thin and non-sinuuous walls with 53.3 x 32.8 m in length and 36.9 m in width, trichomes absent, stomata slightly raised, anamocytic, 53.3 x 12.3 μ . Guard cells, Kidney shaped and longitudinally placed, stomatal opening was 32.8 x 12.3 μ (Fig. 1, II) Stomatal frequency : 138.6 / mm² Stomatal Index : 0.288.

2. *Habenaria rariflora*. A Rich. this saxiulous taxon which was characterized by radical or subradical leaves was collected from Khandala on rock and confined at varous locations in western ghats. (677 - 1800 m). Leaves : 3, sessile, spreading, membranous, linear oblong or lanceolate. acute at the apex, 6.5 - 10 cms x 2.5 cm., hypostomatic. Dermal anatomy Epidermis : Cells polygonal with thin and non-sinuuous walls, 65.6 - 82 x 41-53.3 μ), trichomes absent; stomata slightly raised, anomocytic, elliptic, 61.5 x 20.5 μ , in diameter, guard cells kidney-shaped, oriented in different directions, stomatal opening 53.3 x 8.2 μ in diameter. (Fig. 2, Plate II) Stomatal frequency : 64. / mm² Stomatal index : 0.193. *H gibsonii* Hook. f. This terriolous taxon has finely veined leaves whitish at back, receme with whitish flowers was collected from Khandala and in Western ghats at 600-1800 m. It is met in larger formations of 20-30 plants in moist and shaded niches. Leaves : Upto 7, sessile, membranous, 5-10 cms x 3 cms, ovate-oblong, acute or acuminate, hypostomatic.

Dermal anatomy : Epidermis : Cells polygonal withthin and non-sinuuous walls, 114.8 m x 82 μ in diameter, trichomes absent; stomata slightly raised, anomocytic, elliptic, 73.8 x 8.2 μ , guard cells reniform, stomatal opening 49.2 x 28.7 μ (Fig. 3, II) Stomatal frequency : 37.3/mm² Stomatal Index : 0.1111

3. *H. hyaneana* Lindl. Said terricolous taxon possess leafy stem, leaves turning black in drying, reduced upwards to smaller bract like leaves. It is sparingly distributed as small populations of 2-3 plants at Khandala. Leaves 4-6, sessile, sheathing,

subimbricate, membranous, ovate, acute, erect or recurved. 2.5 - 3.8' 8 cms, hypostomatic. Dermal anatomy : Epidermis : Cells polygonal with thin and non-sinuuous walls, 57.4 - 82 μ x 41. m in diameter. Trichomes present; stomata slightly raised, anamocytic, elliptic, 53.3 x 16.4 m in diameter, guard cells reniform. Stomatal opening 41 x 8.2 m in diameter, (Fig. 4, Plate II). Stomatal frequency : 96 / mm² Stomatal index 0.25.

(5) *Pecteilis susannae* (L) Rafin. This terricolous species was widely distributed at Khandala and other place in the western ghats (848 m). It inhabits humus-rich soils on shady slopes. Stem is leafy upon the inflorescence. Leaves 7-10, sessile, spreading, membranous, ovate-oblong or oblong-lanceolate, imbricating acute or acuminate, 5-15 x 2.5 x -5 cms, hypostomatic. Dermal anatomy. Epidermis-Cells with thin and non-sinuuous walls, polygonal 82-94.3 x 57.4 - 65.6 μ in dimeter. Trichomes absent, stomata slightly raised, anomocytic, elliptic, 65.6 x 16.4 μ , guard cells reniform and vertically placed, stomatal opening. 41 x 16.4 μ in diameter (Fig. 5, Plate II). Stomatal frequency : 16./mm² Stomatal Index 0.056 (6) *Spathoglottis plicata*. Blume. A beautiful species of terriocolous orchids, having vertically erected, sword like leaves, with recemose infloresence in bright purple flowers, very close together near the apex of inflorescence. Cultivated in lateritic soil in Gardens at Mumbai. Leaves 5-8, more and as spreading, vertically erected, linear, cauline, much acute apex, leaves 25-36 x 1.2 - 1.5 cms, hypostomatic. Dermal anatomy : epidermis : Cells with thin and non-sinuous walls, polygonal, 32.-82 x 28.7 - 32.8 μ in guard cells reniform and longitudinally placed. Stomatal opening 24.6 x 4.1 μ (Fig. 6, Plate II). Stomatal frequency : 58.66./mm² Stomatal Index 0.0662.

DISCUSSION

Trichomes were observed in two species, *Habenaria rariflora* A. rich., and *Spathoglottis plicata* Blume., at abaxial side of leaf. Witner et al. (1974) and Vij et. al. (1991) had reported restricted occurrence of trichomes on the lower epidermis in Orchids. Mohana Rao and Khasim (1987)

had reported their absence in the terrestrial orchids. Presence of trichomes in terrestrial sps, namely *Cephalanthera ensifolia* Rich, *Calanthe plantaginea* Lindl., etc. as reported by Vij. et. al., (1991). Their presence has been observed in terrestrial taxa such as. *Habenaria rariflora* A. rich. and *Spathoglottis plicata* Blume. The presence of a dome shaped and some what glandular apex indicates the secretory nature. Stomata were mostly flushed with the epidermis as is true in majority of Orchids (Rasmussen, 1987) and slightly raised than the epidermis in the species of *Habenaria Willd.*, and *Pecteilis susanne* (L.) Rafin.

The stomatal frequency in the present taxa is ranging between 16 to 138.6/mm² and it compares fairly well with those reported earlier in this group of plants. (Singh and Singh, 1974; Avadhani et. al., 1982; Vij. et. al., 1991) The leaves in *Pecteilis susannae* (L) Rafin. were thin and membranous and showed lowest stomatal frequency, the leaves of *Habenaria grandifloriformis* Blatt. and *McCann*, were thick and fleshy and showed highest stomatal frequency in both terricolous species but there was a wide range in their stomatal frequency. Almost similar observations were made by Ziegenspeck (1936), who also recorded a higher stomatal frequency in species of marshy habitats. Vij. et. al. (1991), recorded lowest stomatal frequency in thick fleshy leaves and highest stomatal frequency in thin and membranous leaves. Interestingly, a higher stomatal index was presently observed in terricolous taxa, which were growing on ground and inhabited exposed condition. Such observation were also confirmed by Vij. et. al. (1991). A direct and positive co-relation of light intensity with the stomatal index in Orchids was also indicated. (Rasmussen, 1987).]

The genera of the terricolous orchids namely. *Habenaria Willd.*, *Pecteilis susannae* (L.) Rafin., and *Spathoglottis plicata* Blume.

possess anomocytic stomata surrounded by thin walled polygonal epidermal cells.

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