



**Research Article**

**TAXONOMIC DIVERSITY OF STOMATA IN SOME ANGIOSPERMIC PLANTS SATARA REGION INDIA**

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**Abstract:** Here in current article 10 families' representative 10 genera studied for their stomatal type. Parasitic stomata observed in most of the studied families. (viz. Asteraceae, Verbenaceae, Malvaceae, Commelinaceae, Acanthaceae, Rubiaceae, Euphorbiaceae, Rosaceae, Hameliaceae, Sapotaceae) It may indicate taxonomic relationship of these families. Also measurement of stomatal size for each family was carried out with the help of Olympus steriobinocular microscope using Dewinter Biowizard software unit of measurement.

**Keywords:** Stomata, measurement tool, Angiosperm families

**INTRODUCTION**

Stomata are minute aperture structure on plants found typically on leaf epidermis. Leaf epidermal anatomical features such as stomata, trichomes and other characters are useful anatomical tools. The stomata was firstly studied by Stresburger<sup>1</sup>, then by Vesque<sup>2</sup> who recognized four broad categories of stomata based on the presence and arrangement of accessory cells as well as their mode of development. Most of the stomata observed on lower surface of leaf. On the basis of arrangement of the epidermal cells near the guard cell, more than 25 main types of stomata in dicots have been recognized<sup>3</sup>. Stace<sup>4</sup> reported 31 different types of stomata among cotyledonous plants. The increase in atmospheric CO<sub>2</sub> concentration since industrialization<sup>5,6</sup> and the predicted continued increase into the near future<sup>7</sup> forces the need to understand how the biosphere operates under elevated (relative to pre-industrial) CO<sub>2</sub> levels. The main function of stomata is exchange of gases CO<sub>2</sub>, water vapour and O<sub>2</sub> to move rapidly and out of leaf. The number of stomata on leaf surfaces varies widely among different species of plants. Generally, the lower epidermis of the leaf tends to have more number of stomata than the upper surface. Botanists have made stomatal counts for many species. Here in current article by considering 10 representatives of different families an attempt has been made to study stomata behavior and density.

**MATERIAL AND METHODS**

For this study the material was selected from the plants (Chrysanthemum indicum, Crossandra infundibuliformis, Rhoecolour, Hevea spp., Hammelia patens, Hibiscus rosa-sinensis, Rosa india, Coffea spp., Manilkara zapota, Duranta erect) around Y.C.I.S. campus Satara. For the cuticular studies the peels of fresh leaves were taken and observed and photographed under Olympus steriobinocular

microscope with help of DEC-2000 digital eyepiece. Measurement of length and width of stomata by using Dewinter Bio-wizard software unit of measurement.

**RESULTS AND DISCUSSION**

Photosynthesis and water transport in plants facilitate by specialized epidermal cells of leaves known as Stomata. Here total of 10 angiospermic plant species distributed in 10 genera and 10 families were investigated for their stomatal diversity. Six types of stomata were found in which Paracytic was the dominant one found in 8 species while Anisocytic and diacytic were found in 4 and 3 species respectively. Edeoga et al.<sup>8</sup> reported same in *C. gynandra* and *C. viscosa*. In 4 species two and in 2 species three different types of stomata were found. Amphidiacytic and Staurocytic types of stomata were found only in *Coffea* spp and *Hibiscus rosa-sinensis* respectively (table 1). Similar kind of work conducted in *Hyoscyamus* L. in Iran Ghahreman et al.<sup>9</sup>. Stomata are formed early in leaf development and typically mature by the time the leaf reaches 10-60% of its final size<sup>10</sup>. The fundamental photosynthetic differences between C<sub>3</sub> and C<sub>4</sub> plants have consequences for stomatal based CO<sub>2</sub> reconstructions. C<sub>4</sub> plants, in contrast to C<sub>3</sub>, also fix carbon within their bundle sheath cells. The endodermis enclosing these bundle sheath cells is highly impervious to CO<sub>2</sub>, and consequently CO<sub>2</sub> concentrations within these cells can reach 1000-2000 ppmV<sup>11</sup>. The stomatal indices of selected plant species with the have been recorded in Table 1 and nature and type of stomata have been shown in Fig 1. It is evident from the observations that the variations in stomatal number and stomatal index in studied plant species indicate their response to ecological conditions as that in *Cleome* species<sup>12</sup>. Results (Table 1) are briefly summarized as follows:

**Table 1: Comparative Stomatal Diversity with essential parameters of 10 Angiospermic Plant Species**

Sl.no	Family	Selected genus	Stomatal length (µm)	Stomatal width (µm)	Stomatal index S.I=S*100/E+S	Stomata type
1	<b>Asteraceae</b>	Chrysanthemum indicum	40.95±5.424962	27.55±2.431192	12.5	Diacytic, Paracytic
2	<b>Acantheaceae</b>	Crossandra infundibuliformis	23.45±2.597783	17.54±3.159329	25.283	Paracytic, Diacytic
3	<b>Commelinaceae</b>	Rhoeo spathacea	45.64±3.038161	32.16±4.495939	12.121	Anomocytic, Paracytic, Anisocytic
4	<b>Euphorbiaceae</b>	Hevea spp	36.12±2.387993	28.82±4.398323	36.66	Paracytic
5	<b>Hammelinaceae</b>	Hammelia patens	20.59±1.854339	13.18±1.647392	27.53	Anomocytic
6	<b>Malvaceae</b>	Hibiscus rosa-sinensis	36.47±3.109896	26.14±2.611807	19.852	Staurocytic, Paracytic
7	<b>Rosaceae</b>	Rosa indica	30.67±3.718261	20.65±3.019904	30.23	Paracytic, Anisocytic
8	<b>Rubiaceae</b>	Coffea arabica	26.45±2.767704	14.64±2.017368	19.480	Anisocytic, Diacytic, Amphidiacytic
9	<b>Sapotaceae</b>	Manilkara zapota	25.49±2.42465	19.45±3.602453	28.571	Paracytic
10	<b>Verbanaceae</b>	Duranta erecta	25.34±1.989237	16.90±1.269481	17.47	Anisocytic

**1. Family- Asteraceae**

Eg-Chrysanthemum indicum

In this species two types of stomata are observed namely dicytic & paracytic. In this species number of stomata are 112 & number of epidermal cells are 784 in 1x1mm in area stomatal length & width of this species are 40.95 µm & 27.54 µm respectively & also calculate the index is 12.5 .

**2. Family – Acantheaceae**

Eg-Crossandra infundibuliformis

In this species two types of stomata are observed namely dicytic & paracytic .In this species number of stomata are 268 & numberof epidermal cells are 792 in 1x1mm in area stomatal length & width of this species are 23.45 µm & 17.54 µm respectively & also calculate the index is 25.28.

**3. Family- Commelinaceae**

Eg- Rhoeo discolor

In this species three types of stomata are observed namely anomocytic,anisocytic & paracytic. In this species number of stomata are 16 & numberof epidermal cells are 116 in 1x1mm in area stomatal length & width of this species are 45.64 µm & 32.16 µm respectively & also calculate the index is 12.12

**4. Family-Euphorbiaceae**

Eg-Hevea spp.

In this species one type of stomata are observed namely paracytic .In these species numbers of stomata are 176 & number of epidermal cells are 304 in 1x1mm in area

stomatal length & width of this species are 36.12 µm & 28.82 µm respectively & also calculate the index is 36.66

**5. Family-Hammelinaceae**

Eg-Hammelia patens

In this species one type of stomata are observed namely anomocytic. In this species number of stomata are 304 & numberof epidermal cells are 800 in 1x1mm in area stomatal length & width of this species are 20.59 µm & 13.18 µm respectively & also calculate the index is 27.53

**6. Family-Malvaceae**

Eg- Hibiscus rosa-sinensis

In this species two types of stomata are observed namely staurocytic & paracytic.In this species number of stomata are 108 & number of epidermal cells are 436 in 1x1mm in area stomatal length & width of this species are 36.47 µm & 26.14 µm respectively & also calculate the index is 19.85

**7. Family-Rosaceae**

Eg- Rosa india

In this species two types of stomata are observed namely anisocytic & paracytic.In this species number of stomata are 312 & number of epidermal cells are 720 in 1x1mm in area stomatal length & width of this species are 30.67 µm & 20.65 µm respectively & also calculate the index is 30.23

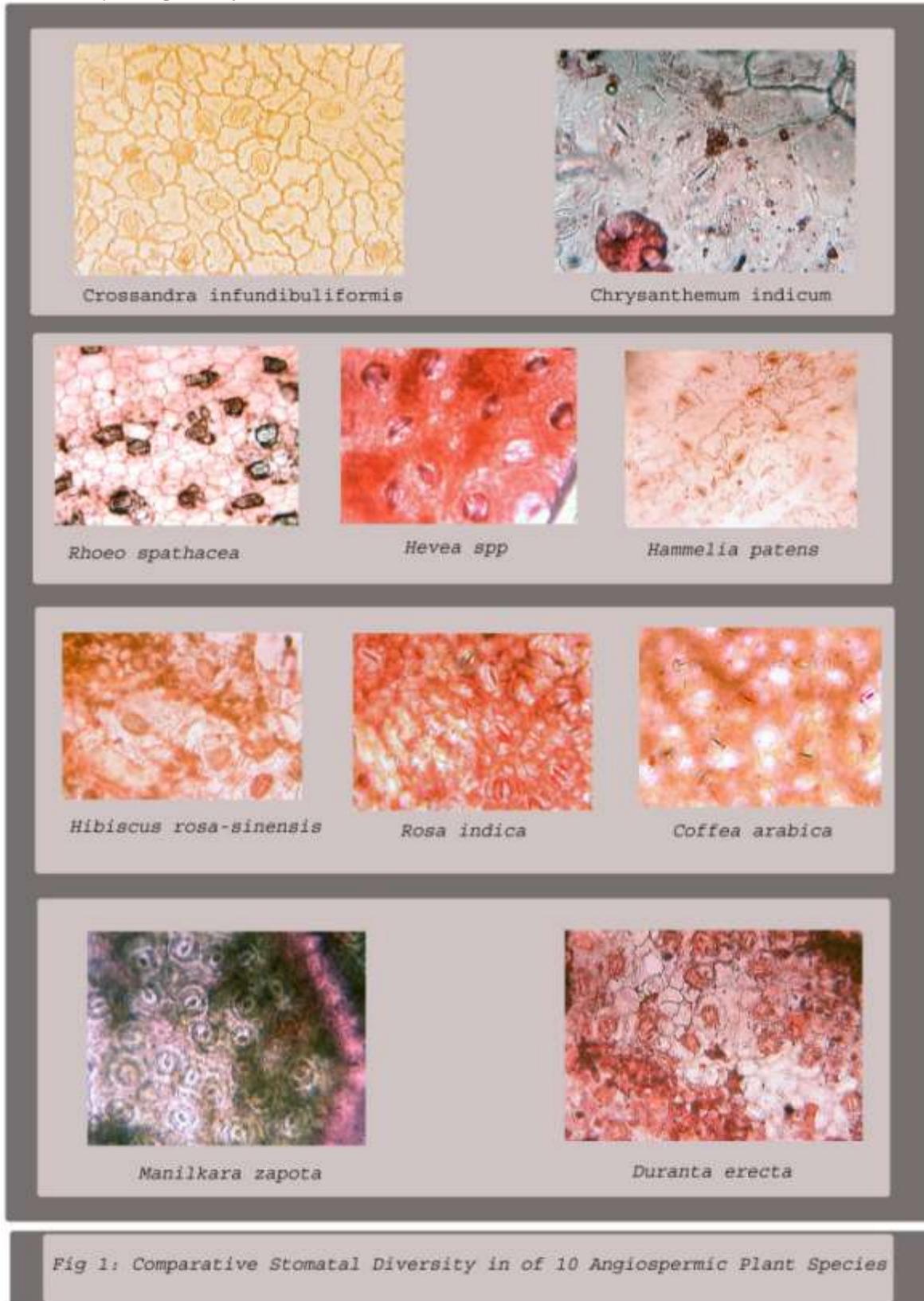
**8. Family -Rubiaceae**

Eg- Coffea spp.

In this species three types of stomata are observed namely anisocytic,diacytic & amphidiacytic.In this species number of stomata are 240 & number of epidermal cells are 992 in

1x1mm in area stomatal length & width of this species are 26.45  $\mu\text{m}$  & 14.64  $\mu\text{m}$  respectively & also calculate the

index is 19.48



**9. Family -Sapotaceae**

Eg- Manilkara zapota

In this species one types of stomata are observed namely paracytic. In this species number of stomata are 264 & number of epidermal cells are 660 in 1x1mm in area stomatal

length & width of this species are 25.49  $\mu\text{m}$  & 19.45  $\mu\text{m}$  respectively & also calculate the index is 28.57.

**10. Family -Verbanaceae**

Eg- Duranta erecta

In this species one type of stomata are observed namely anisocytic. In this species number of stomata are 244 &

number of epidermal cells are 152 in 1x1mm in area stomatal length & width of this species are 25.34  $\mu\text{m}$  &

16.90  $\mu\text{m}$  respectively & also calculate the index is 17.47.

### Conclusion

Parasitic stomata observed common in eight plant species from different families. This may indicate closeness or relationship of these families. While Amphidiacytic and Staurocytic type of stomata found only in *Coffea* spp and *Hibiscus rosa-sinensis* respectively indicates their distinctness. It can be concluded from result that there can be presence of more than one kind of stomata observed in single plant species.

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