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Review Article

Study on the foliar morphology and anatomy of selected *Dischidia* R. Br.

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Abstract: Foliar morphology and anatomy of eight selected species of *Dischidia* R.Br. was conducted to study the identification characters of the species. Qualitative and quantitative morphological characters, stomatal features including stomatal frequency and stomatal index and anatomical foliar features were studied. Analysis of the characters suggested that the leaves of the selected *Dischidia* species can be well differentiated and distinct in their qualitative and quantitative morphological characters. Amphistomatic, paracytic stomata were observed in all the species studied with highest stomata index in *D. nummularia.* Anatomical foliar characters revealed the epiphytic succulent adaptations of the species.

Keywords: Anatomy, Apocynaceae, *Dischidia,* Foliar morphology, Stomata

Introduction

Dischidia R.Br. includes epiphytic herbaceous plants living abundantly on other plants. It belongs to the family Apocynaceae and consists of 80 species (Rahman and Wilcock 1992, Hajari et al., 2018). The genus is native to the tropics and subtropics regions and are widely distributed in China, Taiwan, India, Bangladesh, and Southeast Asia with three non-endemic species occurring in the East Coast tropics of Australia (Chen et al., 1993). *Dischidia* shows the characteristic feature of the family like the opposite leaves and the presence of latex. They are unique succulents and can thrive in bright, indirect light. These species produce normal leaves in addition to the bullate ones. A number of species develop imbricate leaves, which adhere tightly to the growing surface. The underside of the leaf has a space which is filled with roots, and that the ants take advantage of. *Dischidia* is grown as an ornamental

plant, mainly for its attractive foliage with beautiful texture. For decades, organic extracts from *Dischidia* have been reported to have biological activities such as anticancer (Nurrani et al., 2013), antiproliferative, anti-inflammatory (Chen et al., 1993, Benu et al., 2023) and antioxidant. (Nurrani et al., 2013, Benu et al., 2023) Furthermore, previous phytochemistry research on this genus revealed the presence of various compounds, including triterpenes (Forster and Liddle, 1988), friedelinol, dischidiol, glutinone, β-amyrin acetate, taraxerol, 3β,6β, 19α,23-tetrahydroxyurs-12-en-28-oic acid, 3β,6α,19α,23-tetrahydroxyurs-12-en-28-oic acid and 6β,19α,22α-trihydroxyurs- 12-en-3-oxo-28-oic acid), steroids (disformone and sitosteryl-3-O-β glucopyranoside), and flavonoids (kaempferol, isorhamnetin and quercetin). (Chen et al., 1993, Ma et al., 2008). As an ornamental plant the species of *Dischidia* are economically important for the horticulture industry, admired throughout the world, and valued for their aesthetic properties. The size, shape, colour, texture etc adds value to these ornamental plants. Studies of characterization and evaluation of genetic diversity through morphological markers provide basis for breeding programmes since they generate information related to distribution of diversity. This type of characterization should consider botanical descriptors of high heritability, easy measurement, and little genotype x environment interaction (Costa et al., 2015; Melo et al., 2016). Variation in leaf morphology is an important indicator of how plants respond to different environmental conditions. It is an important aesthetic characteristic as far as ornamental plants are considered. Leaves are organs exposed to different environmental factors, and it is reasonable to expect that their morphology and structure represent the responses of the plants to environmental conditions, such as water availability or light intensity, as well as intra- and interspecific interactions (Bruschi et al., 2000; Castro-Díez et al., 1997; Cuevas-Reyes et al., 2018). The plasticity of leaf morphological traits across habitats has long been of interest to ecologists, because these traits are considered good predictors of plant performance and adaptation (Díaz et al., 2001). Moreover, the characteristics of leaf improves the ornamental value of the plants. As far as *Dischidia* is concerned proper identification of the species based on the characteristics of leaves is necessary for the selection of ideal species for the garden. Knowledge of the morphology, growth habit, and data regarding biology of species are of fundamental importance to define strategies in breeding programs. Such practices aim at creating conditions favourable to plant development, and visual quality is an important criterion for consumers that look for plants with immediate decorative effects (Garbez et al., 2018; Oliveira et al., 2017). In this backdrop, an investigation on the leaf morphology and anatomy of selected species of the important ornamental genus *Dischidia* R. Br. is significant and assumes importance. The major objectives of the study are twofold:

(1) Collection, identification, and establishment of the species of the genus *Dischidia* R. Br.
(2) Study the foliar morphology, stomatal characteristics, and anatomy of the selected species

Materials and Methods

The present study refers to ‘Study on the Foliar Morphology and Anatomy of Selected *Dischidia* R. Br.’ Attempts were made to study the foliar morphology, stomatal variations, and anatomy of eight selected *Dischidia* plants collected. Different materials used and various methods adopted in the present

investigation are described below. Field surveys were conducted to locate populations of *Dischidia* R. Br. species. All the plants were collected from different nurseries in Thiruvananthapuram. The collected samples were planted in the Botanic Garden of All Saints' College providing uniform environmental conditions (Plate 1&2). *Dischidia* R. Br. is genus with succulent plants which are epiphytic or lithophytic which grow loosely rooted on host trees or shrubs or on rocks producing aerial roots at nodes to absorb moisture and nutrients from the air. Leaves are all opposite, entire, with variable leaf shapes ranging from orbicular, obovate, ovate to lanceolate types, leaf apices tend to have an obtuse, attenuate, acute to acuminate forms, leaf bases ranges from obtuse, cuneate to attenuate, rounded to obtuse types. Milky white latex is present in all vegetative parts. The stems are terete and semi-corrugated and the inflorescence is generally umbelliform.

The eight *Dischidia* R. Br. species selected for the present study are:

1. *Dischidia formosana* Maxim.

It is a climbing subshrub and grows primarily in the wet tropical biome. Small, fleshy, elliptical to oval-shaped leaves that typically grow in pairs along trailing stems. Small, star-shaped flowers that are typically white to cream-colored. Good drought tolerance due to its succulent characteristics

2. *Dischidia ovata* Benth.

It is a climbing epiphyte or lithophyte and grows primarily in the wet tropical biome. Recognized for its distinctive oval-shaped leaves with a striking silvery-white variegation pattern resembling a watermelon rind; this pattern is most prominent on the leaf veins, giving the plant its unique appearance. Thick, succulent, oval-shaped leaves with a glossy green colour and prominent silvery-white veins, creating a "watermelon rind" pattern. The flowers are small, inconspicuous, white or cream-coloured flowers that are rarely seen on cultivated plants.

3. *Dischidia oiantha* Schltr.

The native range of this species is Philippines. It is a climbing epiphyte and grows primarily in the wet tropical biome. with attractive oval, glossy green leaves. The plant produces tiny, inconspicuous flowers in clusters at the nodes.

4. *Dischidia oiantha* Schltr. 'Variegata'

This unique plant features beautifully variegated leaves in shades of green and white, making it a visually striking addition to any spaceThey have trailing vines that flow abundantly down from the pot and sway in the gentle breeze. The plant produces tiny, inconspicuous flowers in clusters at the nodes.

5. *Dischidia nummularia* R.Br.

This species is with a divided part and a smooth stem adhering to bark of tree trunks. Leaves are small, round that resemble coins or buttons, opposite decussate, orbicular or broadly elliptic, coriaceous, venulose, tomentulose near margin of upper surface, base cuneate, margin entire, minutely ciliate. Flowers small, axillary fascicles.

6. *Dischidia ruscifolia* Decne. ex Becc.

This decorative plant comprises stiff, slender green shoots which are densely decorated in pairs of stiff, succulent, heart-shaped leaves. Flowers are tiny, star-shaped and tubular and white in colour which appear on the internodes and remain for long periods of time. The plant looks graceful in a hanging pot, but is found in dense clumps and clusters on overhead tree branches in its habitat.

7. *Dischidia platyphylla* Schltr.

Dischidia platyphylla, also known as the Shingle Plant and has floppy leaves that overlap each other, giving it a shingle-like appearance. The leaves are a form of domatia, which act as a shelter for ants in an example of mutualism with ants that is found in several species of *Dischidia*. The leaves are small, thick, fleshy, oval-shaped and light green. There are also modified leaves which form a purse-like pouch filled with roots. Its bloom in Bright red to magenta flowers are arranged in clusters known as umbels. The flowers occur in the leaf axils.

8. *Dischidia parasita* (Blanco) Arshed, Agoo & Rodda

Leaves are typically light to medium green, arranged in opposite pairs, linear in shape that are succulent and fleshy. It produces charming, red and crimson vinous coloured tubular flowers that attract butterflies and hummingbirds.

Morphological characterization of the leaves was done in the collected and selected species of *Dischidia* R. Br. Leaf external features typically includes both quantitative and qualitative characters. The Qualitative characters considered for the study includes leaf arrangement, leaf shape, leaf apex, leaf base, leaf margin, leaf texture, petiole texture, adaxial leaf hair, abaxial leaf hair, leaf hair type, hairy petiole, type of petiole hair. The Quantitative characters include number of visible veins, leaf length, leaf width, lead area and petiole length. Five observations were scored for each character. Fresh mature leaves on 4th or 5th node from the shoot tip of the plants representing each species, grown in the garden were collected and the abaxial and adaxial epidermis of the leaves peeled using a forceps. The peeled epidermis were stained in 1% safranine solution, washed in distilled water, mounted in glycerine and observed under the microscope. The structure and types of stomata were determined as per the nomenclature and classification by Prabhakar (2004). The average of number of stomata, epidermal cells and sessile trichomes from five fields per leaf and five leaves per species were calculated. Photomicrographs of the peels were taken using a Leica ICC50HD camera, attached to Leica DM 500 trinocular microscope. The Stomatal index was calculated using the formula:

$$\text{Stomatal Index} = \frac{S}{E+S} \times 100$$

where,

S= No. of stomata/unit area

E= No. of epidermal cells/unit area

Fourth or fifth leaf from the tip of the plant was selected for studying the foliar anatomical peculiarities of the species. Hand sections of least thickness were taken and stained using safranine solution,

washed to remove excess stain and mounted on glass slide using glycerine as mounting agent (Ashok and Ashok, 1999)

Results and Discussion

Results on the study on the foliar morphology and anatomy of selected *Dischidia* R. Br. with respect to the foliar characteristics and stomatal study are presented below. Present studies have brought forth several hitherto unknown information and/or confirmation of certain earlier observation on different aspects of leaf morphology and stomata of the eight selected species of the genera. Floral characters were originally considered the most valuable indicators of taxonomic affinity. Although, this point has stood the test of time, sometimes leaf characters may be also useful in taxonomic studies. Leaves should, however, have a number of theoretical advantages over flowers as taxonomic markers. They are strictly comparable over a wider taxonomic range, and they are generally present on the plant for a much greater part of its life-span (Stace, 1984). As far as an ornamental plant like *Dischidia* R. Br. is considered gross foliar morphological features plays a pivotal role in the identification of the species for a gardener or a plant enthusiast and also for the taxonomist. Foliar features typically studied include both quantitative and qualitative characters. The Qualitative characters considered for the study includes leaf arrangement, leaf shape, leaf apex, leaf base, leaf margin, leaf texture, petiole texture, adaxial leaf hair, abaxial leaf hair, leaf hair type, hairy petiole, type of petiole hair (Table 1). The Quantitative characters include number of visible veins, leaf length, leaf width, leaf area and petiole length (Table 2). All the *Dischidia* species selected for the study showed opposite leaf arrangement which shows that it is the characteristic feature of the genera. Leaf shape varied from species to species. The leaf shapes shown were obcordate (*D. formosana*), ovate (*D. ovata*), oblanceolate (*D. oiantha* and *D. oiantha* 'Variegata'), Rounded (*D. nummularia*), Cordate (*D. ruscifolia*), cuspidate (*D. platyphylla*) and linear (*D. parasita).* Leaf apex also showed variations in character. Emarginate (*D. formosana*), cuspidate (*D. ovata*), mucronate (*D. oiantha* and *D. nummularia),* obtuse (*D. oiantha* 'Variegata'), acuminate (*D. ruscifolia* and *D. platyphylla)* and acute (*D. parasita)* are the various types of leaf tip observed in the species. Leaf base varied from Round (*D. formosana*), Obtuse (*D. ovata*), Acute (*D. oiantha* and *D. oiantha* 'Variegata'), Obtuse (*D. nummularia* and *D. ruscifolia),* Cordate (*D. platyphylla*) to Cuneate (*D. parasita).* All the species shows leaf with entire margin. The leaf texture of *D. nummularia* is granular while all others showed glabrous texture. Adaxial and abaxial leaf hair were absent in all species except *D. nummularia*. Petiole characters a like texture and hairs are also distinct for *D. nummularia.* All the other species showed glabrous petiole but *D. nummularia* showed granular texture with presence of pilose hairs. Analysis of the qualitative characters suggested that the leaves of the selected *Dischidia* species can be well differentiated and distinct in their shapes. *D. oiantha* and its variegated species showed the same shape that is oblanceolate. *D. nummularia* is very peculiar in showing many distinct characters like granular texture of leaf with granular hairs on the abaxial side of the leaf and petiole with pilose hairs. Quantitative foliar characters selected for the study showed wide variations between the species (Figure 1-3). Visible veins are absent in *D. nummularia*, *D. ruscifolia* and *D. parasita.* In *D. ovata* three main veins with variegated markings morphologically can be seen but in *D. oiantha*, *D. oiantha* 'Variegata' and in *D. platyphylla* only one main vein is visible

morphologically. Longest leaf was seen in *D. parasita* (5.66 cm) and the shortest was observed in *D. ruscifolia* (0.82 cm). As far as leaf width is considered *D. formosana* showed maximum width of 3.04 cm and minimum by *D. ruscifolia* that id 0.54 cm. Highest value of petiole length is shown by *D. formosana* (1.28 cm) while the lowest value of 0.2cm is shown by *D. ruscifolia* and *D. platyphylla.* Maximum leaf area is shown by *D. formosana* with 616 mm^2 and minimum by *D. ruscifolia* with 36.8 mm^2. As far as leaf thickness is considered the maximum thickness is shown by *D. nummularia (*2.61 mm) and least by *D. ovata* (0.60 mm). All the species of *Dischidia* R.Br. other than *D. nummularia* showed leaf thickness more than 1mm which suggest that the species showed a succulent nature with respect to foliar thickness. Leaf epidermal characters are generally considered as depending mostly on environmental conditions and of less taxonomic value. To study the nature of epidermis and epidermal modifications of a plant epidermal peel study is necessary. In the present study epidermal study is conducted to observe the variations in epidermal tissues and stomata among the selected species. It was observed that in all species of *Dischidia* R.Br. the stomata are present both on the adaxial and abaxial surface of the leaf. Thus, the species studied showed amphistomatic distribution of stomata. The characteristic type of stomata seen in all the species was paracytic stomata which possess one pair of lateral subsidiary cells oriented parallel with the guard cells.

Stomatal frequency in the selected *Dischidia* R.Br. varied from species to species and between the dorsal and ventral surface (Table 3; Figure 4). Even though the leaf size was the smallest among the species in *D. nummularia* the frequency of stomata was the highest in dorsal and ventral surface compared to other species studied. In *D. formosana*, *D. nummularia* and *D. platyphylla* ventral surface showed more stomatal frequency than the dorsal surface while in *D. ovata*, *D. oiantha*, *D. ruscifolia and D. parasita* dorsal surface showed more stomatal frequency than the ventral surface. But in *D. oiantha* 'Variegata' showed isostomatic condition. The stomatal index was constant within the leaves of a single species. Even though the stomatal number is determined by many extrinsic and intrinsic factors, the stomatal indices are quite constant and can be used in distinguishing different taxa (Poole et al., 1996). In the present study stomatal index was calculated for the dorsal and ventral surface of the *Dischidia* R.Br. studied (Figure 4). In three species (*D. formosana, D. oiantha* 'Variegata' and *D. nummularia)* the stomatal index is more for the ventral surface than the dorsal surface but in all other species the stomatal index is more for the dorsal surface. In *D. oiantha* 'Variegata' stomata per unit area is same for the ventral and dorsal surfaces, stomatal index is dominating on the ventral surface. The average stomatal index of dorsal and ventral surfaces for the species was calculated and studied (Figure 5), which gave a clear picture on the stomatal conductance of the species. Stomatal conductance will give an idea about the photosynthetic efficiency of the species. Among the species studied *D. nummularia* (4.004) showed highest average stomatal index followed by *D. platyphylla* (2.134), *D. ruscifolia* (2.041), *D. ovata* (1.818), *D. oiantha* (1.779), *D. oiantha* 'Variegata' (1.736), *D. parasita* (1.643) and *D. formosana* (1.637). Photosynthetic capacity is closely linked to stomatal density (Xu and Zhou, 2008). Moreover, photosynthetic potential might be enhanced with increased stomatal density in *Arabidopsis* by a modulating gas diffusion function, as was recently reported by Tanaka et al. (2013).

Table 1 Qualitative Morphological Characteristics of selected *Dischidia* R. Br.

Characters	*D. formosana*	*D. ovata*	*D. oiantha*	*D. oiantha 'Variegata'*	*D. nummularia*	*D. ruscifolia*	*D. platyphylla*	*D. parasita*
Leaf arrangement	Opposite	Opposite	Opposite	Opposite	Opposite	Opposite	Opposite	Opposite
Leaf shape	Obcordate	Ovate	Oblanceolate	Oblanceolate	Round	Cordate	Cuspidate	Linear
Leaf apex	Emarginate	Cuspidate	Mucronate	Obtuse	Mucronate	Acuminate	Acuminate	Acute
Leaf base	Round	Obtuse	Acute	Acute	Obtuse	Obtuse	Cordate	Cuneate
Leaf margin	Entire	Entire	Entire	Entire	Entire	Entire	Entire	Entire
Leaf texture	Glabrous	Glabrous	Glabrous	Glabrous	Granular	Glabrous	Glabrous	Glabrous
Adaxial leaf hair	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Abaxial leaf hair	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent
Leaf hair type	-	-	-	-	Granular	-	-	-
Petiole texture	Glabrous	Glabrous	Glabrous	Glabrous	Granular	Glabrous	Glabrous	Glabrous
Hairy petiole	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent
Type of petiole hair	-	-	-	-	Pilose	-	-	-

Table 2 Quantitative Morphological Characteristics of selected species of *Dischidia* R. Br.

Sl. No.	Species	Quantitative Morphological Characters					
		No. of visible main veins	Leaf length (cm)	Leaf width (cm)	Leaf area (mm^2)	Leaf thickness (mm)	Petiole length (cm)
1	*D. formosana*	1	2.7	3.04	616	1.55	1.28
2	*D. ovata*	3	2.52	2.4	426.4	0.60	0.5
3	*D. oiantha*	1	2.68	1.6	344	1.92	0.72
4	*D. oiantha* 'Variegata'	1	3.26	1.58	386	2.29	0.64
5	*D. nummularia*	0	1.16	1.08	76.6	2.61	0.26
6	*D. ruscifolia*	0	0.82	0.54	36.8	2.33	0.2
7	*D. platyphylla*	1	2.6	2.32	541	1.30	0.2
8	*D. parasita*	0	5.66	0.82	359.6	2.54	0.9

Table 3 Stomatal parameters of selected species of *Dischidia* R. Br.

Species	Surface	Stomatal frequency	No. of Epidermal cell per unit area	Stomatal Index	Average Stomatal Index
D. formosana	Dorsal	2.2	136.6	1.571	1.637
	Ventral	2.8	162.6	1.703	

D. ovata	Dorsal	2.4	113.6	1.93	1.818
	Ventral	2.2	129.2	1.706	
D. oiantha	Dorsal	3.6	152.6	2.334	1.779
	Ventral	2.8	232.8	1.224	
D. oiantha 'Variegata'	Dorsal	2.8	171.8	1.682	1.736
	Ventral	2.8	158.8	1.789	
D. nummularia	Dorsal	4.8	132	3.728	4.004
	Ventral	5.2	128	4.28	
D. ruscifolia	Dorsal	3.2	141.2	2.201	2.041
	Ventral	2.4	123.8	1.88	
D. platyphylla	Dorsal	3.2	138	2.345	2.134
	Ventral	4.8	293	1.922	
D. parasita	Dorsal	3.6	174.6	2.018	1.643
	Ventral	1.8	140	1.267	

According to this concept the decrease in photosynthetic efficiency can be observed from *D. nummularia, D. platyphylla*, *D. ruscifolia*, *D. ovata*, *D. oiantha*, *D. oiantha* 'Variegata', *D. parasita* to *D. formosana* in the species studied. *D. nummularia,* showed a fast growth by the accumulation of biomass that it fills the pots in which it is planted within two months. This may be due to high photosynthetic productivity which the species is genetically possess. Further studies in this regard are essential.Some most recent studies (Zhao et al., 2015) had established significant negative correlations of stomatal density with photosynthesis and demonstrated that higher stomatal density reduced leaf photosynthesis. They argued that small stomata could maintain the pores opening with lower guard cell turgor pressures compared with larger stomata. The higher stomatal density and reduced stomatal size responding to drought can effectively inhibit transpirative water loss and better ensure water balance (Bosabalidis and Kofidis, 2002).

Anatomical characters of the leaves of the selected species of *Dischidia* R.Br. showed very specific characters compared to any dicot leaves. In all the species the upper and lower epidermis showed barrel like cells. The mesophyll tissue characteristically present as homogenous, polygonal, large compactly arranged cells with no differentiation into palisade and spongy tissues. Even though vein and veinlet markings are observed in some of the species, vascular tissues are least represented anatomically. In the species studied showed the presence of three strands in *D. formosana*, two strands (*D. ovata*, *D. oiantha*, *D. oiantha* 'Variegata', *D. nummularia* and *D. platyphylla*), and in *D. ruscifolia* and *D. parasita* only one strand of xylem tissue represented by few cells were present. In *D. ovata* even though three prominent veins were evident morphologically, anatomically the central vein region is represented by homogenous, compactly arranged small cells with no differentiation into vascular tissue. Two strands of vascular tissue represented mainly by few xylem cells can be seen on either side of the leaf. Laticiferous tissue was observed in the anatomical sections of all the species which is represented by one or two groups of parallelly arranged cells.

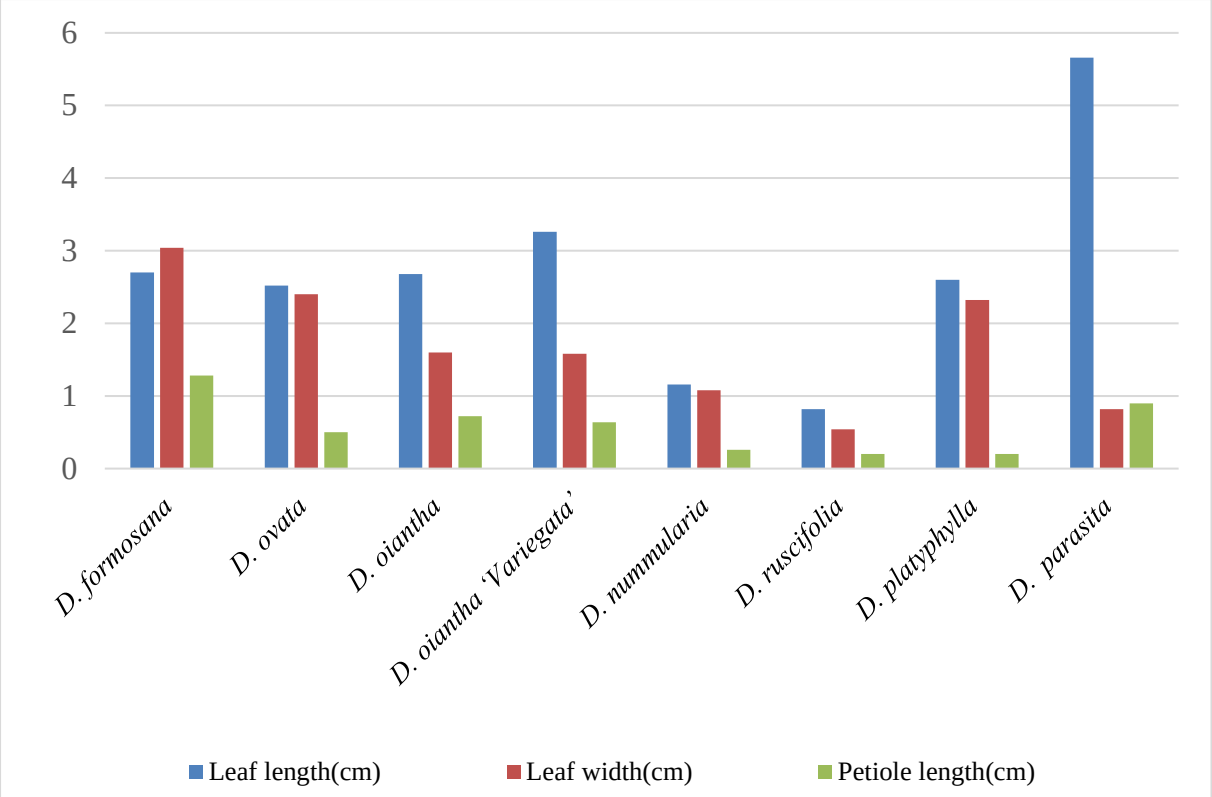

Figure 1: Variations in the leaf length, leaf width and petiole length among the selected species of *Dischidia* R. Br.

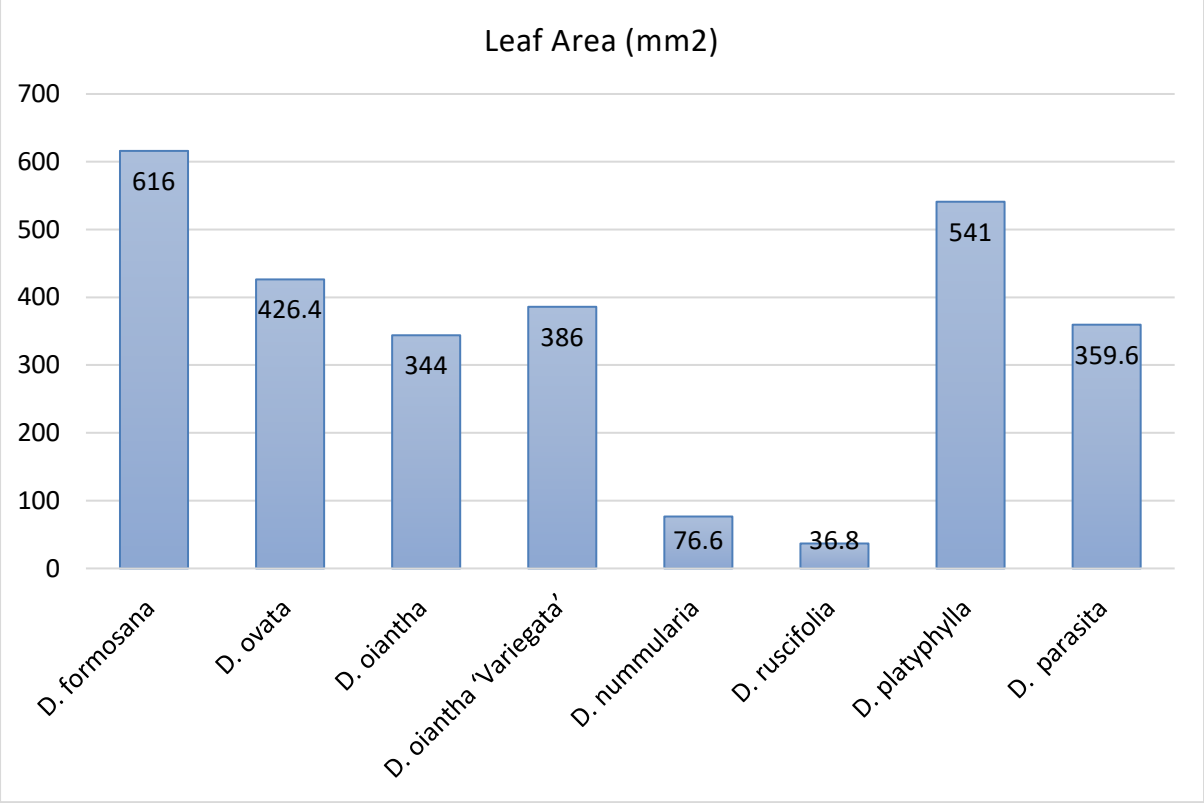

Figure 2: Variations in the leaf area among the selected species of *Dischidia* R. Br.

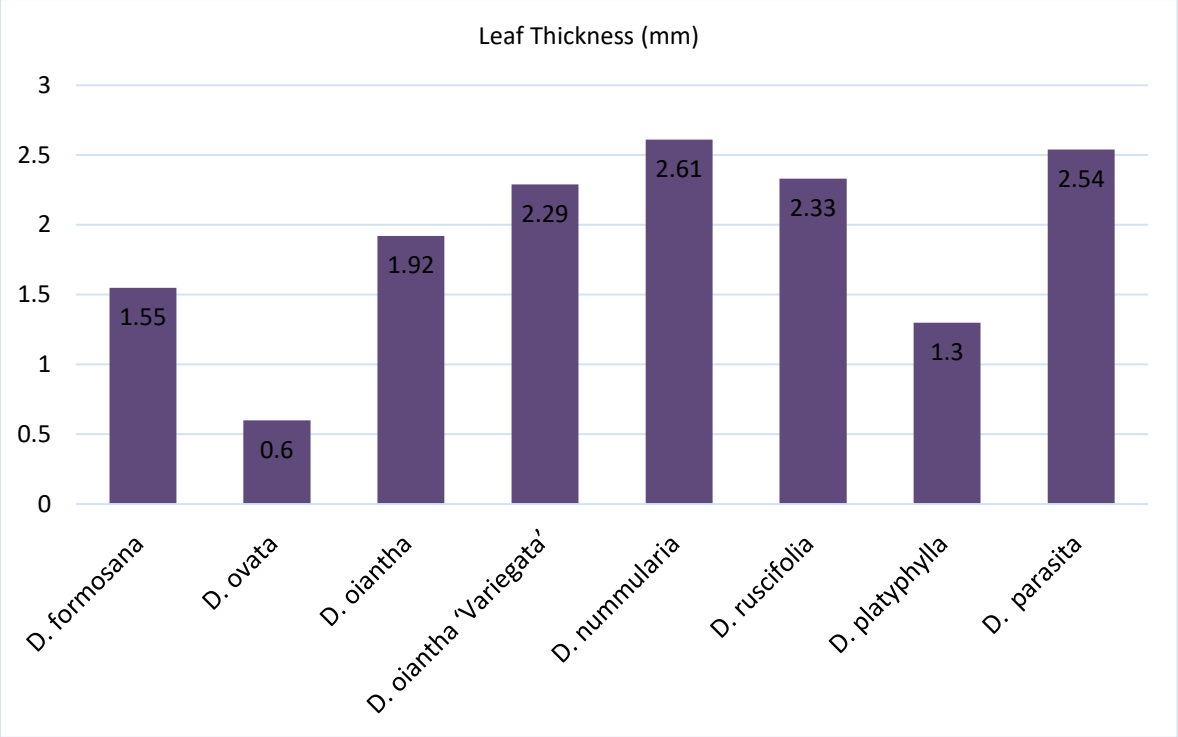

Figure 3: Variations in the leaf thickness among the selected species of *Dischidia* R. Br.

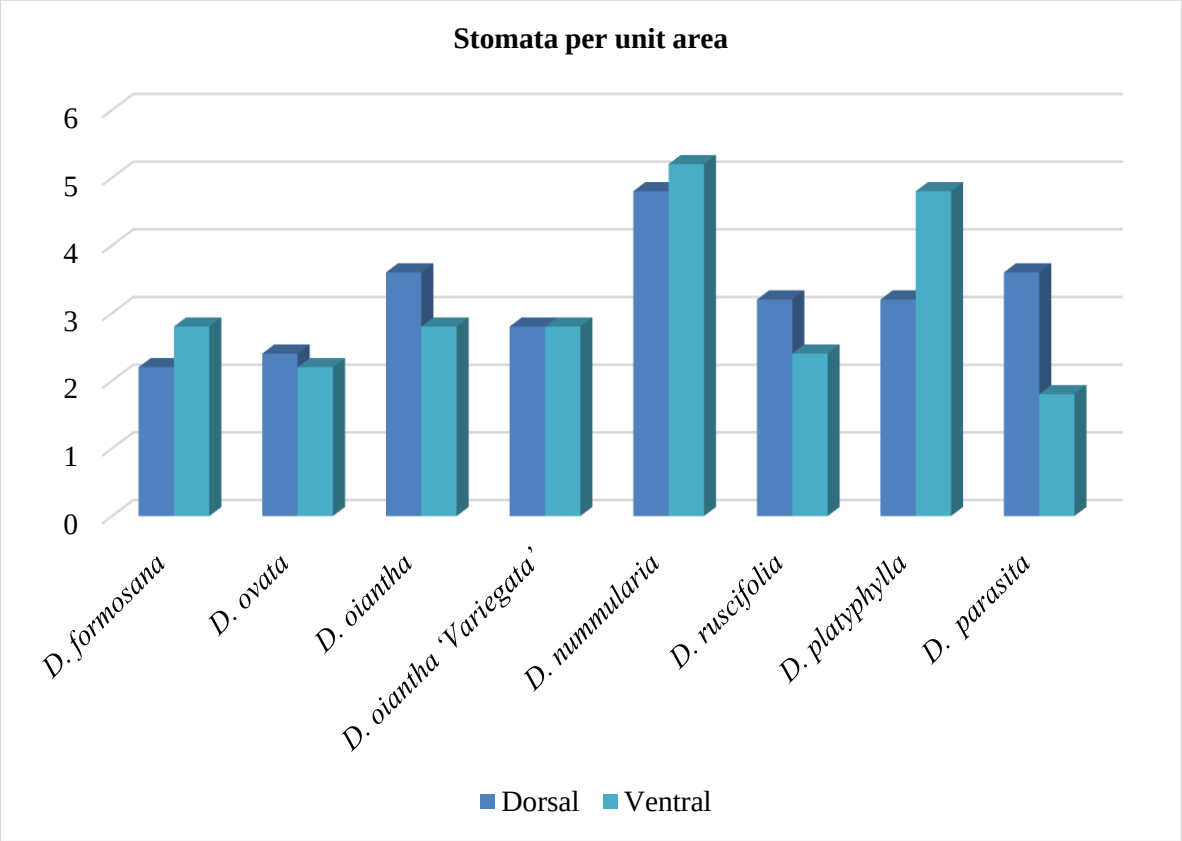

Figure 4: Variations in the Stomatal frequency on the dorsal and ventral surface among the selected species of *Dischidia* R. Br.

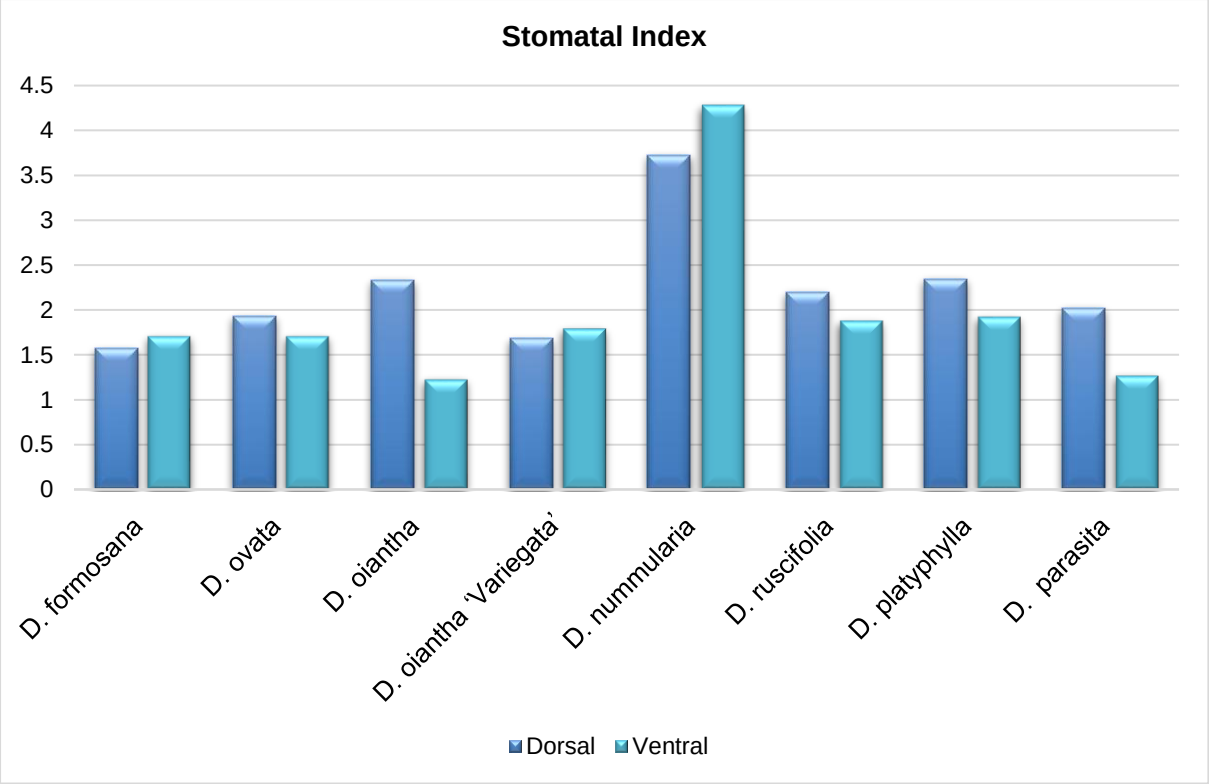

Figure 5: Variations in the Stomatal Index on the dorsal and ventral surface among the selected species of *Dischidia* R. Br.

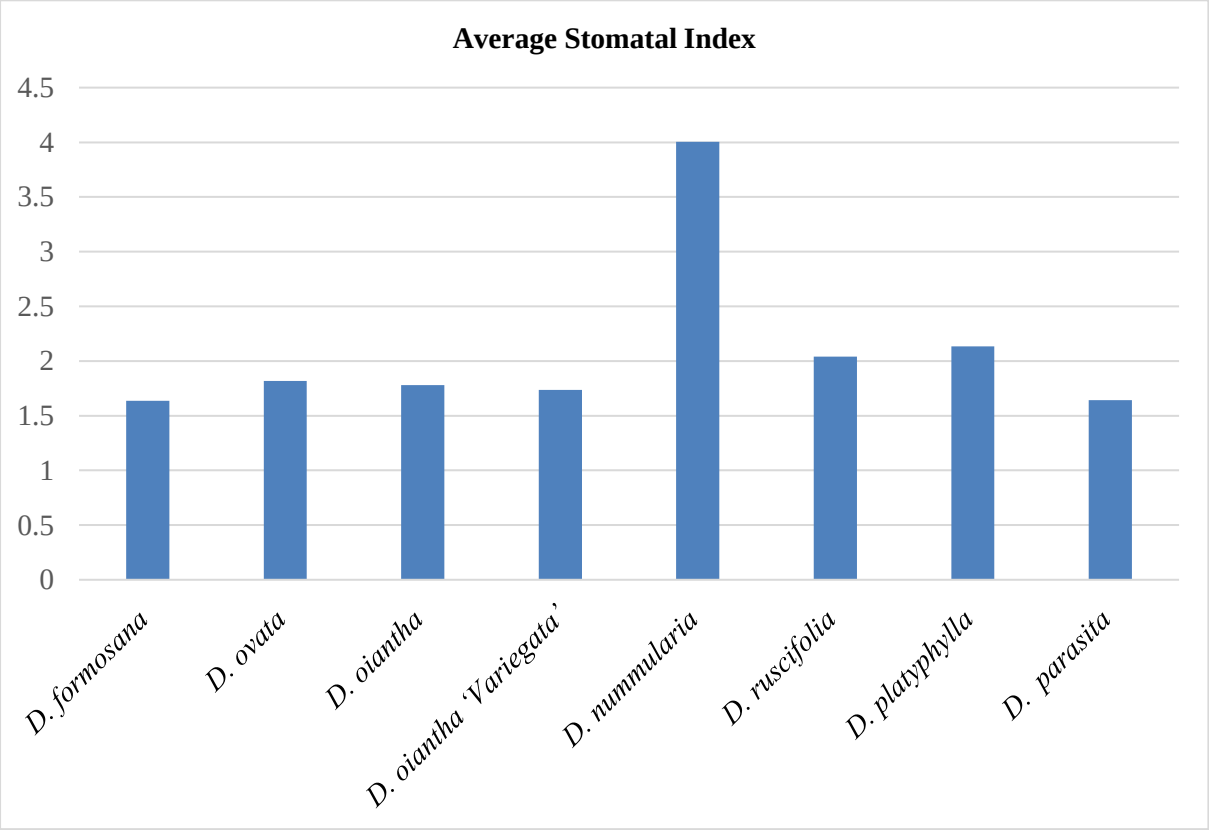

Figure 6: Variations in the Average Stomatal Index among the selected species of *Dischidia* R. Br.

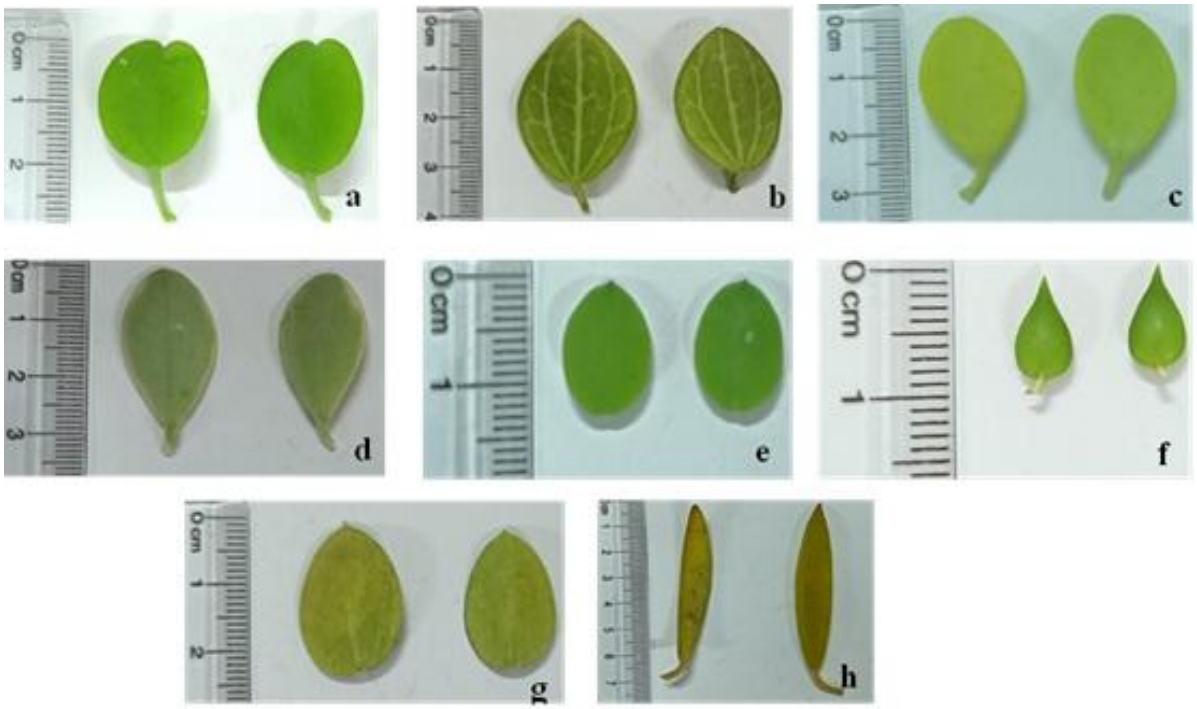

Plate 1: Leaves of (a) *D. formosana*, (b) *D. ovata*, (c) *D. oiantha*, (d) *D. oiantha* 'Variegata', (e) *D. nummularia*, (f) *D. ruscifolia*, (g) *D. platyphylla* and (h) *D. parasite*

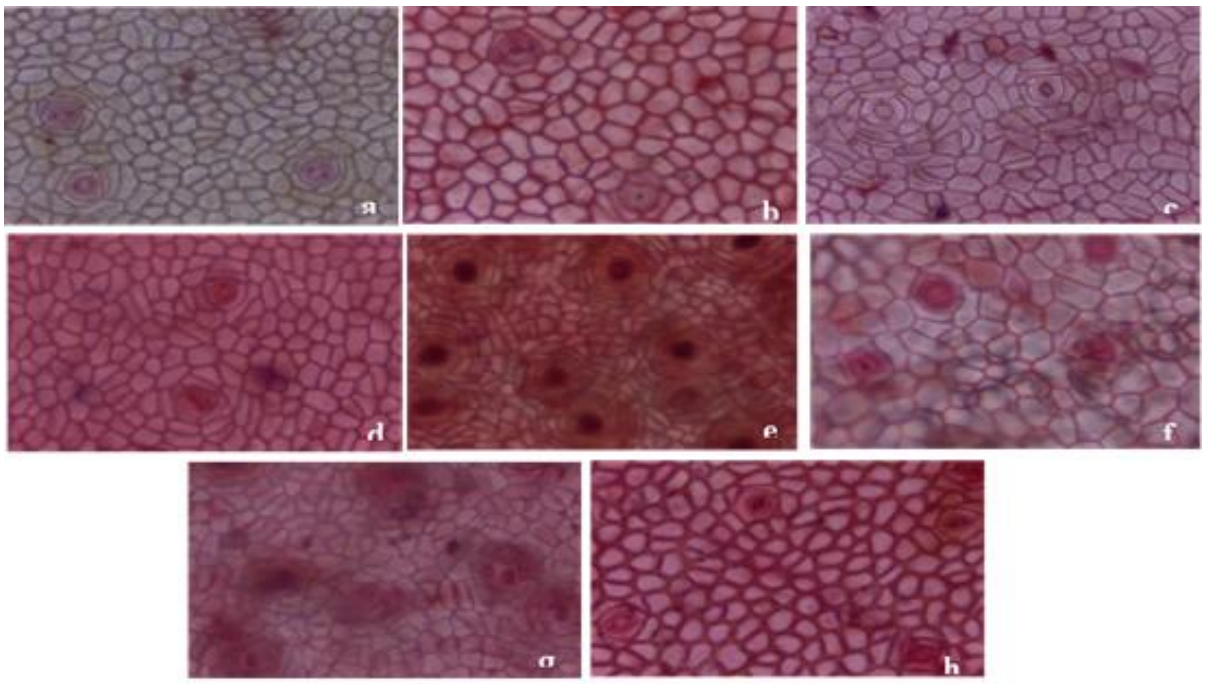

Plate 2. Stomata of (a) *D. formosana*, (b) *D. ovata*, (c) *D. oiantha*, (d) *D. oiantha* 'Variegata' (e) *D. nummularia*, (f) *D. ruscifolia*, (g) *D. platyphylla*, (h) *D. parasita* (400X)

The morphological and anatomical features of *Dischidia* leaves of selected Philippine *Dischidia* R. Br. were conducted by Arshed and Agoo (2017). They observed isopalisade and homogenous mesophyll

cells, which was the first to report about the nature of *Dischidia* mesophyll type. They suggested that this mesophyll characterization is a gray feature for systematics due to its environmental susceptibility.

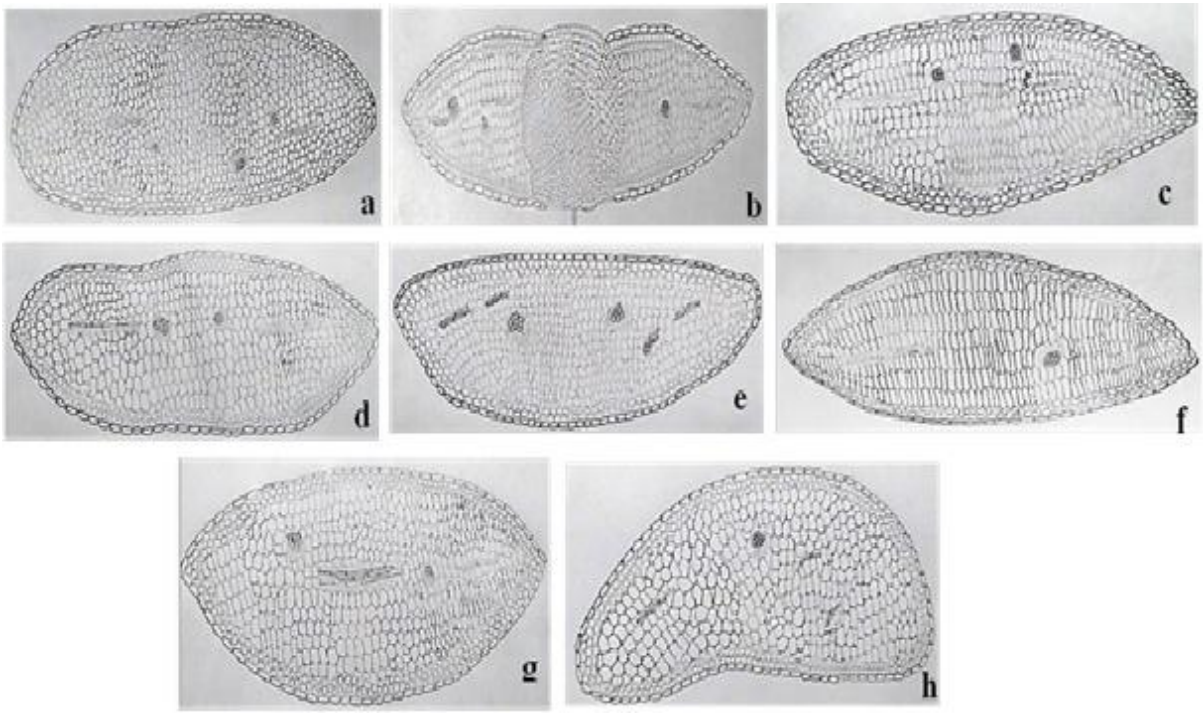

Plate 3: Foliar anatomy of (a) *D. formosana*, (b) *D. ovata*, (c) *D. oiantha*, (d) *D. oiantha* 'Variegata', (e) *D. nummularia*, (f) *D. ruscifolia*, (g) *D. platyphylla*, (h) *D. parasita*

Based on the present study it was observed that in the species *Dischidia* R.Br. foliar anatomical features suggest that the plant shows succulent nature with xerophytic adaptations. Roots are formed from all most all nodes which lead to the least development of vascular tissue which is an adaptation of its epiphytic nature. Thus, based on the study of its foliar characteristics it is evident that the *Dischidia* R.Br. species studied were well adapted plants with both xerophytic and epiphytic adaptations and can thrive the ecological challenges than any other species.

Conclusion

Dischidia R.Br. includes epiphytic herbaceous plants and belongs to the family Asclepiadaceae and consists of 80 species*. Dischidia* is grown as an ornamental plant, mainly for its attractive foliage with beautiful texture. Ornamental plants are economically important for the horticulture industry, admired throughout the world, and valued for their aesthetic properties. Proper identification of the species for the researchers and gardeners were slight confusing and such an identification of the species is the need of the time. Foliar characterization of the species studied revealed certain morphological characteristics specific for the species with which the species selected were very well identified. *D. nummularia,* showed many prominent characteristics which can be related to its biomass accumulation, fast growth and further study in this regard is essential. Laticifers of the species need special study as it may also relate to the adaptation of the species to the change in environment and its allelopathic and defence mechanisms. Further investigation is necessary on the stomatal conductance, gaseous exchange, and other parameters to substantiate the photosynthetic efficiency of the species.

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