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Research Article

Study of Stomata in some species of *Alocasia* and *Syngonium* of family Araceae juss.

Meenakshi Vaidya

S.V.K.M's Mithibai College, Vile-Parle West, Mumbai 400056

ABSTRACT

Araceae, a tropical family consisting of 109 genera and about 2,239 species. Plants are mostly herbaceous, habit rarely aquatic. Rootstock is rhizomatous or tuberous or cornous. Leaves are simple or compound, parallel or net veined. Laticifers are common. Silica bodies lacking, oxalate raphides present. Inflorescence is simple spadix with a spathe. Flowers are minute, sessile bisexual or more commonly unisexual with reduced perianth or without perianth. Stamens are six in a flower. Carpels are three, syncarpous. Ovules one - many on axile or parietal or basal or peudulous placenta. Fruit is berry. There are several genera belonging to Araceae whose taxonomic position is not clear. Stomata in *Dieffenbachia, Scindapsus, Arisaema, Lysichiton* and few species of Araceae stated that family is characterised by possession of 4 or more than 4 subsidiary cells in majority of its members representing the primitive status of the family within monocotyledons. So, stomatal complexes study in two genera and 11 species was undertaken in the present work to understand the taxonomic position of these members of Araceae and also to determine taxonomic utility of anatomical characters.

Key words: *Alocasia, Syngonium,* paracytic, amphibrachyparacytic, brachyparatetracyctic, paratetracytic, cyclocytic, and brachyparacytic.

INTRODUCTION

Engler[1] determined that if Araceae were to be classified as a natural group, flower structure aloone was insufficient. The detailed anatomical and morphological study led him to classify the family into 8 sub-Families. Structure and ontogeny of stomata in monocots received attention as early as 1869 by Strasburger and later by many workers like Campbell[2], Cuttler[3], Benecke[4], Solla[5]. Further considerable work has been done by Solereder and Meyer[6], Shah and Gopal[7-8], Williams[9]. Comprehensive work on the subject has Dunn et al[10] and Dilcher[11].Stomata of *Philodendron* have been studied by Vaidya[12]& stomata of some members of Malvaceae have been reported by Chachad & Vaidya[13].

MATERIAL AND METHODS

All the specimens required for present study were collected from various localities of Bombay and Maharashtra. The details are as follows. The arrangement of species is followed as recognized by Engler and Krause [14- 17].

The identification was confirmed in consultation with Indian National Herbarium and B.S.I. western circle.
The leaf cuticles were removed by treating with conc. HNO3 followed by 10 % KOH for 5-10 minutes each. They were washed with water and stained with 1 % saffranine or haematoxylin. The peels were washed again with water and dehydrated through alcohol-Xylol grades and mounted in DPX.
The photographs were taken on Nikon Microphotographic camera at 10x 45X magnification.
The arrangement of tribes and genera followed in the text is after Engler and Krause[14-17].
The terminology followed is as suggested by Dilcher[11].

S. No	Genus	Species	Locality
1.	*Alocasia*	*amazonica*	Bandra
2.	*Alocasia*	*chelsonii*	Bhavan's College garden
3.	*Alocasia*	*lowii*	Panvel
4.	*Alocasia*	*macrorhiza*	Bhavan's College garden
5.	*Alocasia*	*zebrina*	Bhavan's College garden
6.	*Syngonium*	*auritum-fantasy*	Bandra
7.	*Syngonium*	*hoffmannii*	Bandra
8.	*Syngonium*	*podophyllum*	Bandra
9.	*Syngonium*	*podophyllum-artovirens*	Bandra
10.	*Syngonium*	*ruth-fraser*	Bandra
11.	*Syngonium*	*xanthophilum*	Bandra

OBSERVATIONS

1. *Alocasia amazonica*(Fig. 1)
   Stomata are brachyparacytic and amphibrachyparacytic. Guard cells are kidney-shaped with thick inner and outer ledge. Subsidiary cells are semicircular in shape and flank the sides of the guard cells and with thin wall. epidermal cells are irregular in shape with thin walls. Cell contents are prominent.
2. *Alocasia chelsonii*(Fig. 2)
   Stomata are brachyparacytic and amphibrachyparacytic. Guard cells are kidney-shaped with thick inner and outer ledge. Subsidiary cells are semicircular in shape and flank the sides of the guard cells and with thin walls. Epidermal cells quadrangular, pentagonal and hexagonal with thick walls.
3. *Alocasia lowii* (Fig. 3)
   Stomata are brachyparatetracytic. Guard cells are kidney-shaped with thick inner and outer ledge. Lateral and polar subsidiary cells are almost rectangular in shape with +- thick walls. Epidermal cells are wavy in outline and irregular in shape with thick walls. Cell contents are prominent.
4. *Alocasia macrorhiza* (Fig. 4)
   Stomata are paracytic and paratetracytic. Guard cells are kiendy-shaped with thick inner and thin outer ledge. In paracytic type subsidiary cells are semicircular in shape and in paratetracytic the polar cells are almost quadrangular in shape and lateral cells are semilunar with thick walls. Epidermal cells are wavy in outline with thin walls.
5. *Alocasia zebrina* (Fig. 5)
   Stomata are paracytic. Guard cells are kidney-shaped with thick inner and outer ledge. Subsidiary cells are almost rectangular with thick walls. Epidermal cell walls are wavy in outline with thick walls. Cell contents are prominent.
6. *Syngoniumauritum fantasy* (Fig. 6)
   Stomata are brachyparatetracytic and cyclocytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Lateral subsidiary cells are almost rectangular while polar subsidiary cells are also almost rectangular with thick walls. Epidermal cells are quadrangular, pentagonal and hexagonal with thick walls. Cell contents are prominent.
7. *Syngonium hoffmannii* (Fig. 7)
   Stomata are paratetracytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Lateral and polar subsidiary cells are almost rectangular with thick walls. Epidermal cells are irregular and polygonal with thick walls. Cell contents are prominent.
8. *Syngonium podophyllum* (Fig. 8)
   Stomata are paratetracytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Subsidiary cells are almost rectangular with thick walls. Epidermal cells are pengatonal

and hexagonal with thick walls. Cell contents are prominent.

9. *Syngonium podophyllumatrovirens* (Fig. 9)
   Stomata are paratetracytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Subsidiary cells are almost semicircular in shape with thick walls. Epidermal cells are irregularly polygonal with thick walls. Cell contents are prominent.
10. *Syngonium ruth-Fraser* (Fig. 10)
    Stomata are paratetracytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Subsidiary cells are elongated and rounded with thick walls. Epidermal cells are pengatonal and hexagonal with thick walls. Cell contents are prominent.
11. *Syngonium podophyllumzanthophilum* (Fig. 11)
    Stomata are paratetracytic. Guard cells are kidney-shaped with thick inner and outer ledge. Subsidiary cells are semicircular in shape with thin walls. Epidermal cells are quadrangular, pentagonal and hexagonal with thick walls. Cell contents are prominent.

RESULT & DISCUSSION

Tribe : Steudenerinae
Sub-tribe : Alocasinae
Genus : *Alocasia*

A.	*zebrina*	paracytic
A.	*amazonica*	amphibrachyparacytic & brachyparacytic
A.	*chelsonii*	amphibrachyparacytic & brachyparacytic
A.	*lowii*	brachyparatetracyctic
A.	*macrorhiza*	paracytic&paratetracytic

Tribe : Syngonieae
Genus : *Syngonium*

S. auritum fantasy	brachyparatetracytic & cyclocytic
S. Hoffmannii	paratetracytic
S. podophyllum	paratetracytic
S. podophyllumatrovirens	paratetracytic
S. Ruth Fraser	paratetracytic
S. xanthophilum	paratetracytic

Sub-tribe Alocasinae shows paracytic, brachyparacytic, amphibrachyparacytic, brachyparatetracytic type of stomata. Tribe Syngaonieae has brachyparatetracytic and cyclocytic to paratetracytic type of stomata.

CONCLUSION

The present work includes 11 species of which 1 species is paracytic, 5 species are paratetracytic, 1 species is brachyparatetracytic, 2 species are brachyparacytic and amphibrachyparacytic, 1 species is brachyparatetracytic and cyclocytic, 1 species is paracytic & paratetracytic. In majority of the species subsidiary cell number is 2, sometimes 4-6. The non-fixity of the stomatal type may itself be taken as an indicator of primitive condition of the family

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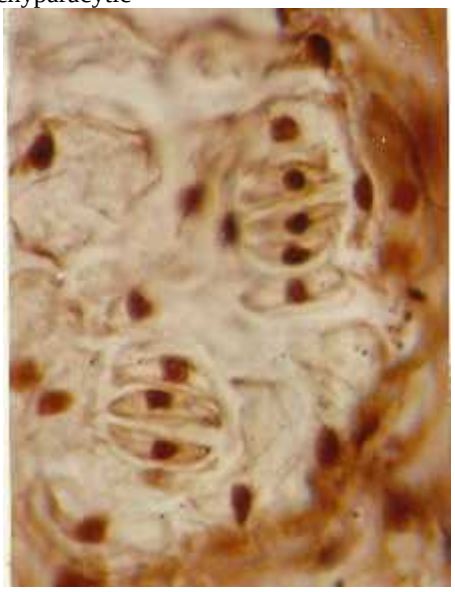

Fig. 1
Alocasia amazonica

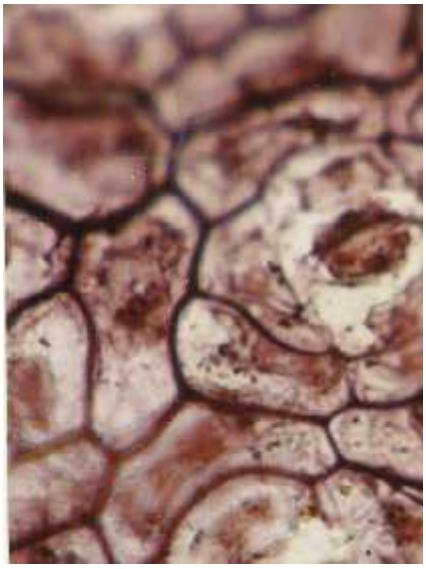

Fig. 2
Alocasia chelsonii

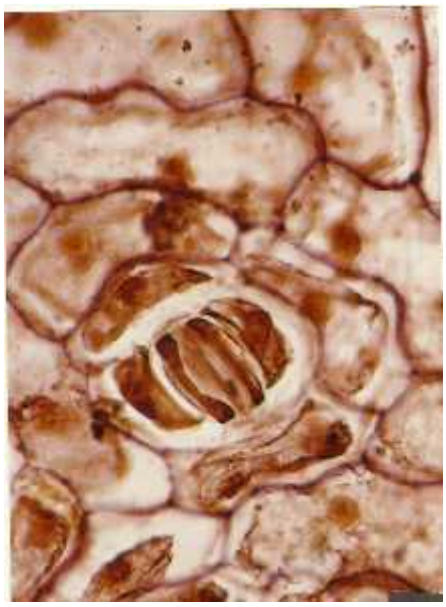

Fig. 3
Alocasi alawii

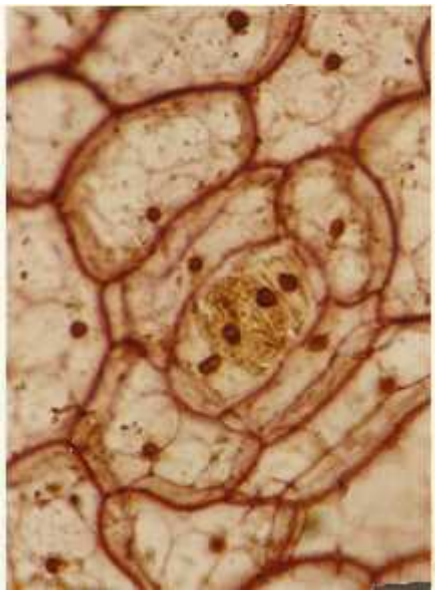

Fig. 4
Alocasia macrorhiza

Fig. 5
Alocasia zebrina

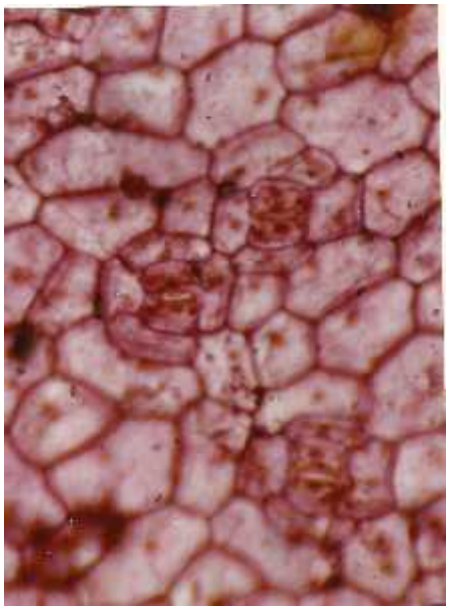

Fig. 6
Syngoniumauritum fantasy

Fig. 7
Syngonium hoffmannii

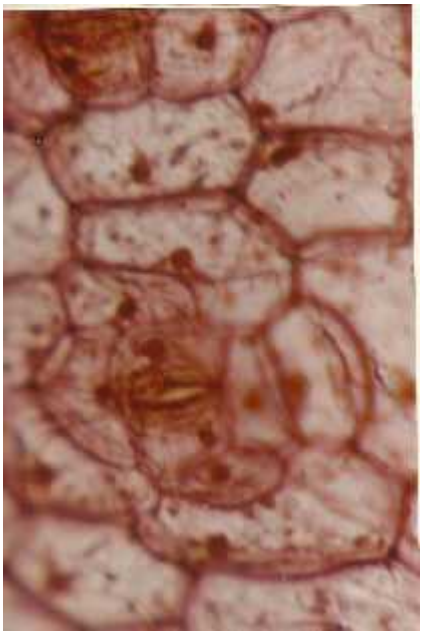

Fig. 8
Syngonium podophyllum

Fig. 9
Syngonium podophyllumatrovirens

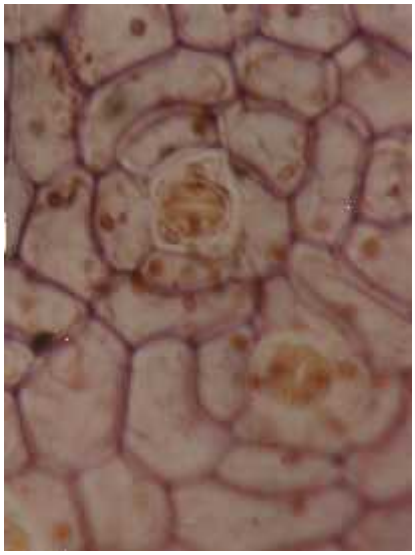

Fig. 10
Syngonium ruth-Fraser

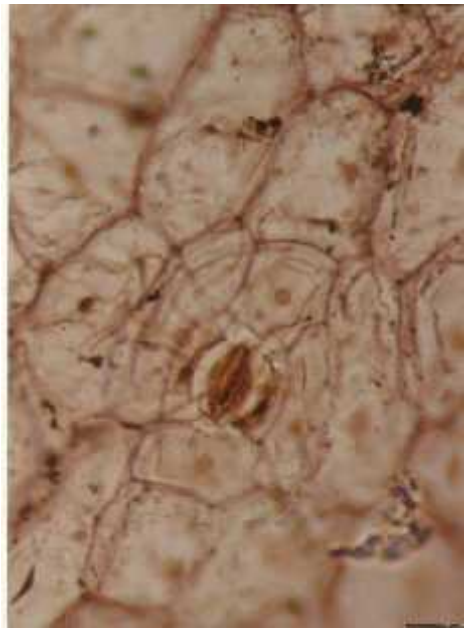

Fig. 11
Syngonium podophyllumzanthophilum

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