Plant Archives Vol. 26, Supplement 1, 2026 pp. 191-195 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2026.v26.supplement-1.027

PALYNOLOGICAL STUDIES OF THE GENUS *SONERILA* ROXB. IN KARNATAKA, INDIA

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(Date of Receiving : 17-08-2025; Date of Acceptance : 23-10-2025)

ABSTRACT

The genus *Soneria* is an acaulescent and caulescent herb from the Melastomataceae family, comprising a species-rich genus with a total count of 15 species in Karnataka. The micromorphology of pollen is measured using a Scanning Electron Microscope (SEM). All species show differences in size about 10–25 µm & 25–50 µm in each varies and striate to micro striate surface shown. The present record discusses the Pollen morphology of the genus *Sonerila* in Karnataka, India.
Keywords **:** Colporate pollen, Karnataka, Pollen morphology, *Sonerila*, Western Ghats.

Introduction

The Melastomataceae Juss. family is distributed in the Neotropical regions of the world, which comprises 169 accepted genera (Kew Royal Botanical Garden, POWO, 2025) and currently has 5,858 accepted species (Ulloa *et al*., 2022), and in the genus *Sonerila,* 208 accepted species (POWO 2025). The family key character of the leaf shows acrodromous venation (Hickey 1973). The tribe Sonerilae (Melastomataceae) occurs in Southeast Asia and Madagascar, with a few species from Neotropical regions (Renner 1993). The genus *Sonerila* Roxb., a complex genus in Melastomataceae, explained in the Old World, is represented by 180 taxa (Cellinese, 1997). In India, the genus *Sonerila* reports 50 species and one variety out of 43 species endemic to the Western Ghats (Resmi *et al*., 2021). In Karnataka, 15 *Sonerila* species has been reported and recently *Sonerila konkanensis* Resmi & Nampy added to the Karnataka state flora, including *Sonerila talbotii* Giri & Nayar, *Sonerila raghaviana* Ratheesh, Sunil, Nandakumar & Shaju, *Sonerila bababudangiriensis* Karadakatti & Kakkalameli, *Sonerila gigantea* Karadakatti & Kakkalameli and *Sonerila charmadiensis* Karadakatti & Kakkalameli, which are endemic to the state (Saldanha 1984; Giri & Nayar 1986; Ratheesh *et al*., 2014; Sanjappa & Sringeswara 2019; Ravikumar *et al*., 2021; Karadakatti & Kakkalameli 2024; Karadakatti & Kakkalameli 2025a; Karadakatti & Kakkalameli 2025b; Karadakatti & Kakkalameli 2025c). The present deliberation is on the micromorphology or pollen diversity of the genus *Sonerila* from Karnataka, which has been discussed using SEM (Fig. 4) (Patel *et al*., 1984; Giri & Nayar, 1986; Bhattacharya *et al*., 2006). The *Sonerila* genus pollen parameter has been described hitherto in India by Resmi *et al*., (2021) in *S. konkanensis*, Karadakatti & Kakkalameli (2025) in *S. bababudangiriensis*, and Karadakatti & Kakkalameli (2025) in *S. gigantean*. The majority of the pollen grains are *Minutae* to *Mediae* about 10 – 25 µm to 25 – 50 µm, and have heterocolpate, in size, they varied, and even in the polar view showed triangular obtuse angles.

Materials and Methods

The genus *Sonerila* in Karnataka is listed based on records from previous reports (Gamble 1915, Cook 1817, Saldanha 1976, Sringeswara & Sanjappa 2019, Resmi & Nampy 2021, Karadakatti & Kakkalameli 2024 and Karadakatti & Kakkalameli 2025) and collected all specimens processed and pressed using the Smith & Chinnappa 2015; BSI 2025 method, with authentication by the UASB acronym based on Herbarium deposition in the University of Agricultural Science, Bangalore (GKVK) garden. Using evidence that each species has been collected and processed using the Erdtman 1952 method to study pollen

morphology based on the NPC system (Erdtman 1952; Kasinath *et al*., 2006). The specimen anthers were collected with 70% alcohol to remove unwanted gelatinous substance and to cover the detailed surface photographs using JSM-IT500LA Scanning Electron Microscope by JEOL Japan (USIC-SAIF-DST, Karnatak University, Dharwad) for future reference.

Study Area:

The obligate adaptation of the *Sonerila* species in the Western Ghats regions in Karnataka, comprising deciduous forest, evergreen forest, shola forest and rain forest. The survey almost conducted from Belgaum (Northern region of Western Ghats of Karnataka) to the Kodagu region (Southern region of Western Ghats of Karnataka). According to the surveyed regions (Belgaum, Uttar Kannada, Shivamogga, Udupi, Dakshina Kannada, Chikmangaluru, Kodagu, Hassan), complying with the specific climate conditions promotes the proper habitat for the distribution of the Sonerila genus in the Melastomataceae from Karnataka regions (Figure-1).

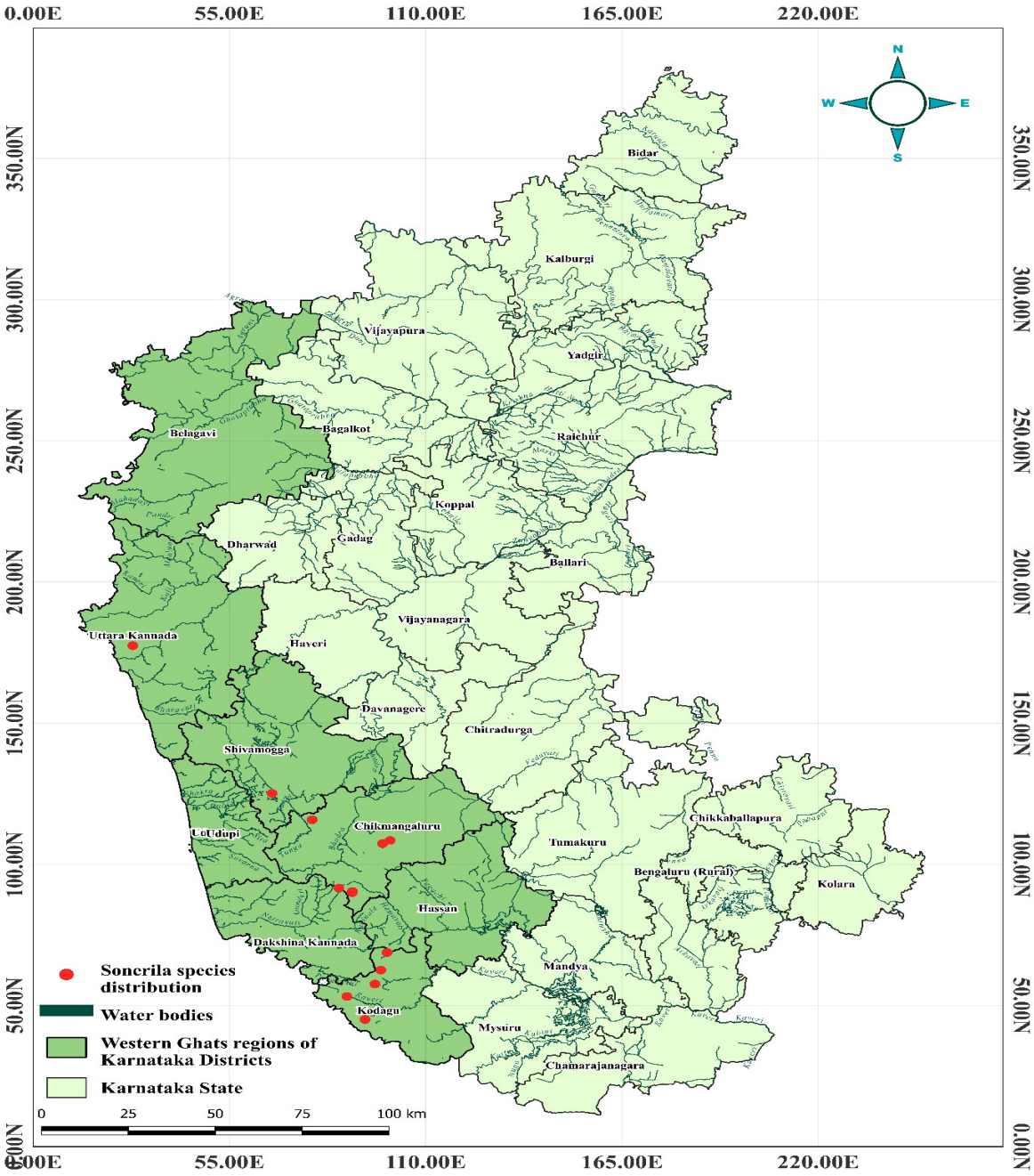

Fig. 1 : *Sonerila* species distribution Map (QGIS 7.1)

Results and Discussion

Table 1 : Pollen Measurement and Shapes of the genus *Sonerila* species in Karnataka.

Sl No.	Species Name	Accession Number	Measurements			Shape		
			PL in µm	PB in µm	PL/PB in µm	PV	EV	Surface
1	*Sonerila bababudangiriensis* Karad & Kakkal	UASB 5770	19.44 ± 0.37	14.46 ± 0.67	1.34	Quadrangular, obtuse, convex.	Rombic, truncate.	Striato-reticulate, tectate.
2	*Sonerila charmadiensis* Karad & Kakkal	UASB 5725	18.04 ± 0.74	13.77 ± 0.32	1.31	Trianular, obtuse, convex.	Rhombic, acuminate, obtuse.	Micro - Rugulate, tectate.
3	*Sonerila gadgiliana* Ratheesh & Sivad	UASB 5809	17.73 ± 0.20	16.63 ± 0.60	1.06	Triangular, obtuse, convex.	Rhombic, obtuse, truncate.	Psilate, tectate.
4	*Sonerila gigantean* Karad & Kakkal	UASB 5782	17.33 ± 0.67	14.21 ± 0.38	1.21	Triangular, obtuse, convex.	Elliptic, truncate	Psilate, tectate.
5	*Sonerila konkanensis* Resmi & Nampy	UASB 5611	23.24 ± 0.16	14.33 ± 0.15	1.62	Triangular, acute, convex.	Rhombic, acuminate, obtuse.	Striato-reticulate, tectate.
6	*Sonerila raghaviana* Ratheesh, Sunil, Nandakumar & Shaju	UASB 5810	17.48 ± 0.12	16.63 ± 0.52	1.05	Triangular, obtuse, convex.	Elliptic, truncate.	Striato-reticulate, tectate.
7	*Sonerila rheedei* Wall. ex Wight & Arn.	UASB 5808	20.39 ± 0.60	14.57 ± 0.82	1.39	Triangular, obtuse, convex	Elliptic, truncate.	Striato-reticulate, tectate.
8	*Sonerila rotundifolia* Bedd.	UASB 5797	18.99 ± 0.19	15.54 ± 0.47	1.22	Triangular, obtuse, convex	Rhombic, obtuse, truncate.	Striato-reticulate, tectate.
9	*Sonerila scapigera* Hook.	UASB 5817	24.47 ± 0.96	14.64 ± 0.16	1.67	Triangular, obtuse, convex	Rhombic, obtuse truncate.	Psilate, tectate.
10	*Sonerila talbotii* G.S.Giri & M.P.Nayar	UASB 5813	27.75 ± 0.90	13.88 ± 0.83	1.99	Triangular, acute, convex	Rhombic, acute truncate.	Striato-reticulate, tectate.
11	*Sonerila veldkampiana* Ratheesh, Mini & Sivad.	UASB 5811	20.41 ± 0.54	18.08 ± 0.66	1.12	Triangular, obtuse, convex.	Rhombic, obtuse, truncate	Striate, tectate.
12	*Sonerila versicolor* var. *axillaris* (Wight) Gamble	UASB 5815	27.73 ± 0.60	24.37 ± 0.14	1.13	Triangular, obtuse, convex.	Rhombic, obtuse, truncate.	Micro - Striate, tectate.
13	*Sonerila wallichii* Benn.	UASB 5798	20.57 ± 0.16	12.49 ± 0.10	1.64	Triangular, obtuse, convex.	Elliptic, Obtuse, truncate.	Striate, tectate.

PL = Pollen Length, PB = Pollen Breadth, PV = Polar View & EV = Equatorial View

Pollen Morphological studies on the genus *Sonerila* species in Karnataka

The plants are herbaceous, caulescent, and acaulescent, which are widely distributed through their specific obligate habitats to promote species richness in the Western Ghats regions of Karnataka, bringing pollen character variations in interspecific. The recorded *Sonerila* species in Karnataka are approximately 13 out of 15, exhibiting spheroidal triangular, obtuse convexity in the polar view, while the remaining two show triangular, acute convexity. The pollens of each species, in an equatorial view, are rhombic, obtuse, acute and truncate in shape. The all-species parameters exhibit measurements of approximately 10–25 µm & 25–50 µm, with a mean of *Minutae* to *Mediae* (Table-1). The family exhibits the pollens with triangular, obtuse or acute or spheroidal, rhombic, sometimes elliptic, and truncate in both polar view and equatorial view as per the present reports, and earlier by Patel *et al*., in 1984 explained that the family Melastomataeae is tricolporate or triporate (Tococa), radially symmetrical, isopolar (perhaps

heteropolar in Tococa stephanotricha), even the exomorphology bases three pollen groups reported heterocolpate with pseudocolpi, "heterocolpate" with intercolpar concavities and triporate. The genus *Osbeckia* sp & *Tibouchina* sp, Lateral view. The exine surface is rugulate & Sublateral view with a pseudocolpus at the center (Patel *et al*., 1984). Chantaranothai 1997, pollen morphology of Melastomataceae in Thailand reported with 5 major classified pollen characteristics known of Pternandra (subsidiary colpi and interpolar concavities absent), Diplectria (concavities present with Ornamentation psilate or micro regulate), Anerindeistus (Ornamentation striate to micro-striate), Blastus (Ornamentation at poles psilate or micro-rugulate), Pachycentria type (Ornamentation at poles scabrate verrucate and micro-rugulate) and the major genus *Anerincleistus, Blatus, Diplectria, Dissochaeta, Dissotis, Macrolenes, Melastoma, Memecylon, Ochthocharis, Osbeckia, Otanthera, Oxyspora, Pachycentria, Phyllagathis, Pseudodissochaeta, Pternandra, Sarcopyramis* and *Sonerila* pollen characters with parameter reported. As per the Resmi & Nampy 2021 *Sonerila konkanensis* pollen showed 3-zonocolporate oblate spheroidal, striate with sculpturing parallel to the aperture and subsidiary colpi. The *Sonerila bababudangiriensis* Karadakatti & Kakkalameli pollen is quadrangular and convex in polar view, acuminate and obtuse in rhombic shape at the equatorial view, and the aperture is heterocolpate (Karadakatti & Kakkalameli 2025a). According to the NPC-based pollen characters in *Sonerila gigantea*, as reported by Karadakatti & Kakkalameli (2025 b), the pollen has a triangular, obtuse, convex shape in the polar view and a non-angular, elliptic, truncate obtuse aperture heterocolpate, striate-reticulate texture (Table-1 and Figure-2).

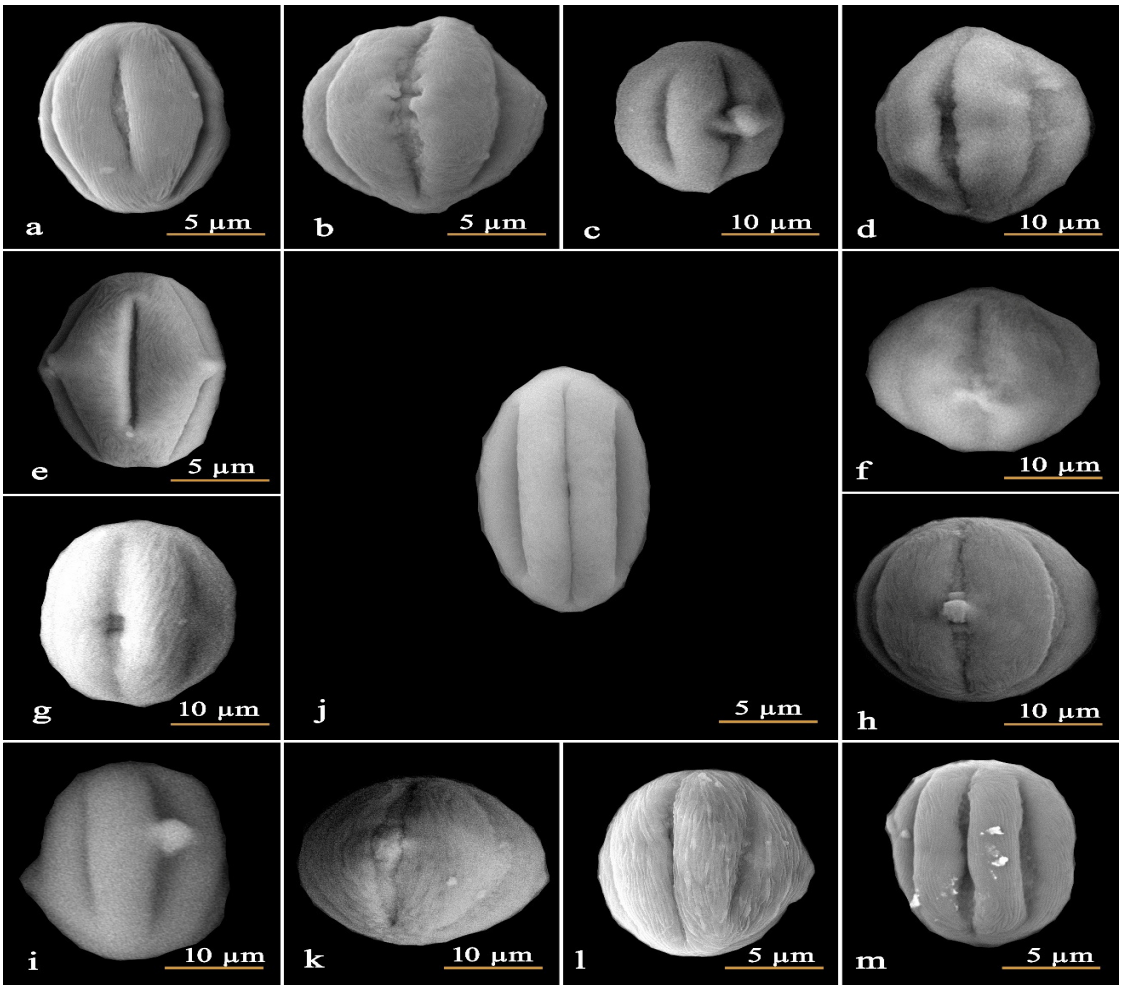

Fig. 1 : Pollen Morphology SEM images of genus ***Sonerila*** in Karnataka. **a.** *S. bababudangirensis*, **b.** *S. charmadiensis*, **c.** *S. gadgiliana*, **d.** *S. gigantea*, **e.** *S. konkanensis*, **f.** *S. raghaviana*, **g.** *S. rheedei*, **h.** *S. rotundifolia*, **i.** *S. scapigera*, **j.** *S. talbotii*, **k.** *S. veldkempiana*, **l.** *S. versicolor* var *axillaris*, **m.** *S. wallichii*. (DST-SAIF, USIC KUD)

Conclusion

The genus *Sonerila* in Karnataka is distributed in the tropical regions which among the 15 reported hitherto and present 13 species taken for micromorphology investigation, in which the pollen characters are explained in tabular form with the Length and width nearly about 10–25 µm & 25–50 µm, range is named *Minutae* to *Mediae*. As per the previous reported characteristics shows an equatorial view, is rhombic, obtuse, acute and truncate in shape and earlier reports classified the pollen characteristics by the two major views, explained as polar view and equatorial views, ornamentation based on the pollen surface striate or micro-striate with rugulate. The pollen characters and parameters assign the specificity of each species or individual identity, as per the listed parameters and characteristics of pollen.

Acknowledgement

Thankful to UGC affiliated USIC DST-SAIF by the Karnatak University, Dharwad, Pavate Nagar, Dharwad, for the provision of the SEM (Scanning Electron Microscope) for my research work. And thanks for the authentication of all my species through the acronym-based herbarium in the University of Agricultural Science, Bangalore, GKVK, Bangalore, Curator Dr A. N. Sringeswara Sir and my research colleagues Darshan R C & Praveen T helped during the data interpretation.

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