Geographical Distribution of Sageraea laurina Dalzell.

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ABSTRACT

Background: The Western Ghats is one of the Mega Biodiversity hot spots at the global level due to its high number of endemic plant species. That plant species, especially the endemics, have been reported and published in Red Data Book regularly. Sageraea laurina Dalzell. belongs to the plant family Annonaceae. It is endemic to Western Ghats of India. The International Union for Conservation of Nature (IUCN) provided the status of this plant which is present in the Western Ghats. This is coming under near threat in the Western Ghats. The present distribution of S. laurina is only restricted to the Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu states only.

Methods: For primary data collection used repeated surveys of some areas under study using GPS. For secondary data collection used different literature such as Floras, database and herbarium consultation from BSI and ARI, Pune. Their taxonomy was re-investigated to confirm their taxonomic distinctness and Identification and classification of S. laurina Dalzell by using different Floras.

Results: During the study, 118 different GPS localities were noted in the Western Ghats of India. The population distribution of this species covered the Northern (81%), Central (16%), and Southern (3%) Western Ghats of India.

Conclusion: In the present study, we are generating primary and secondary data to stand a species in the IUCN category. Generated data used for conservation of this species. The major goal of the species recovery programme will be to re-establish the populations within their natural habitat

Key-words: Endemic, Geographic distribution, Sageraea laurina Dalzell, Western Ghats

INTRODUCTION

The Western Ghats is one of the 34 biodiversity hot spots at the global level due to its high number of endemic plant species. The plant family Annonaceae comprises 135 genera and 2500 species and Annonaceae is one of the chemically least known families [1]. In India, the family have contained 24 genera and 123 species, were the composition of Sageraea in India total taxa 6 and endemic taxa are 4 [2]. Worldwide distribution of the Sageraea genus consists of 9 species, where Sageraea distribution ranges from Peninsular India and Sri Lanka to Indonesia and the Philippines and distribution in India as endemic concern for Western Ghats of India (Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu) [3]. It is endemic to the Western Ghats of India. This plant is found under canopy tree species of the evergreen forest of Western Ghats [4–6]. S. laurina Dalzell plant coming under lower risk/near threat in the Western Ghats of India [7]. S. laurifolia is known to be endangered, vulnerable, or rare but where there is not enough information to say which of the three categories is appropriate for the species [8]. S. laurina wood is yellow or red and its special characteristics are heavy, hard, tough, elastic. This plant wood is used for making furniture and agricultural equipment. Sometimes these plant wood are used for an as alternative purpose. Leaves morphology similar to laurel medicinal plants so, sometimes these medicinal plants use as adulterants [9].

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**Sageraea** sp. wood is helpful for the construction timber of buildings \[10\]. Alkaloids, saponins, and terpene chemicals were reported in the bark of *Sageraea* sp. \[11\]. In Karnataka state, Shimoga district lives a tribal people. *S. laurifolia* is extremely endangered, where tribal people use this plant disease treatment leaves, bark, and seeds use as dysentery, and peptic ulcer treatment \[12\]. The leaves have medicinal value \[13\]. *S. laurifolia* leaves are used as a treatment for rheumatism and ripened fruits are eaten by tribal peoples \[14\]. The genus *Sageraea* is used for the treatment of AIDS disease \[15\].

The taxonomic citation is *S. laurina* Dalz in Hook’s J. Bot. Kew. Misc. 3: 207. 1851. *Guatteria laurifolia* Graham, Cat. 4. 1839, non Dunal 1817. *S. laurifolia* (Graham) Blatt., Journ. Bombay Nat. Hist. Soc. 34: 294. 1930; Debika Mitra in B. D. Sharma et al. Fl. India 1: 282. 1993; Sivar. & Mathew, Fl. Nilambur 42. 1997; Sasidh., Fl. Parambikulam WLS 6. 2002. *S. dalzellii* Bedd., Inc. t. 42. 1874, pp.; Gamble, Fl. Pres. Madras 12(8). 1915; Sasidh. & Sivar., Fl. Pl. Thrissur For. 33. 1996; M. Mohanan in P. Daniel, Fl. Kerala 1: 170. 2005. *Bocagea dalzellii* (Bedd.) Hook. f. & Thoms. in Hook. f., Fl. Brit. India 1: 92. 1872, pp. The taxonomic description is tree 6 to 12 m tall in height, evergreen. Leaves 8.0 to 17.5 x 4.5–6.2 cm, elliptic, or elliptic–lanceolate or oblong to lanceolate, coriaceous, shining, apex subacute, base rounded. The flowers are creamish. Fruits size 2.5 cm across, globular, wrinkled when dry. Flowering & fruiting from October to April month observed during the study \[16,17\].

**MATERIALS AND METHODS**

**Primary data collection**- A repeated survey of some areas under study using the Global Positioning System (G.P.S.) (Fig. 1-3).

**Secondary data collection**- Using different literature such as Floras, India Biodiversity Portal, Survey of sacred groves of Ratnagiri district and their floristic diversity, tropical plants database etc \[9,18,19\].

**Taxonomy and Morphology**- Identified and classification of *S. laurina* Dalzell were done using the different Floras and other available literature \[20,21\] as well as Collected the samples and prepared to herbarium specimens (Table 1).

**Herbarium consultation**- The *S. laurina* Dalzell identified by using different herbarium (some deposited herbarium no. 23789, 23788, 22780, 43286, 196795, 38430, 73604, 99695, 58982 and 73606) of BSI and ARI, Pune herbaria. This plant database was gathered from the Western Ghats of India (Fig. 4).

| Table 1: Taxonomy hierarchy of *S. laurina* Dalzell |
|-----------------------------------------------|
| **Kingdom** | Plantae |
| **Phylum** | Tracheophyta |
| **Class** | Magnoliopsida |
| **Order** | Magnoliales |
| **Family** | Annonaceae |
| **Genus** | Sageraea |
| **Species** | *S. laurina* Dalzell |
| **Common names** | Andi, Har-kinjal, Kiland, Sager |

![Fig. 1: Sageraea laurina Dalzell Plant](image1)

![Fig. 2: S. laurina Dalzell flowering](image2)

![Fig. 3: Sageraea laurina Dalzell fruiting](image3)
RESULTS

During the study, 118 different GPS localities were noted in the Western Ghats of India. The population distribution of this species covered the Northern (81%), Central (16%), and Southern (3%) Western Ghats of India. Analyzed primary and secondary database of S. laurina species population distribution highest from Northern Western Ghats, moderate from Central Western Ghats and least from Southern Western Ghats of India (Fig. 5). This plant population distributed above sea level altitude range is from 22 to 1000 meters. Here is a variable range of altitude levels observed. This plant has unique observation noted; these are patchy populating grown on the sea-facing sloppy mountain range of Western Ghats.

The present study brings a significant finding on the population distribution of this species; that random sampling was done at many sites in Maharashtra states. During the survey, there is one of the important observations noted, that this plant found under canopy tree species of an evergreen forest in the Western Ghats. This Plant population distribution slope region of Western Ghats Mountains. This plant patchy population was observed during the study. Studied plant population distribution observed in states and national reserve forests that included some regions of Wildlife Sanctuary, National Parks, reserve forests, and forest ranges (Table 2).

The local tribal people used this plant wood for various purposes i.e. making agricultural instruments, furniture, and fuel. Vast range S. laurifolia deforestation in some regions of Western Ghats the result are plant coming under endangered/ risk IUCN category.

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**Fig. 4:** Distribution of S. laurina Dalzell in Western Ghats of India

**Fig. 5:** G. P. S. localities of S. laurina Dalzell.
Table 2: Geographic distribution of *S. laurina* Dalzell.

| S.No. | G.P.S. location          | Altitude (Meter) | Locality                                      | Reserve forest Type                                      |
|-------|--------------------------|------------------|-----------------------------------------------|---------------------------------------------------------|
| 1.    | N 19.437811, E 72.920842 | 614              | Tungareshwar Road, Usgaon, Maharashtra        | Tungareshwar Wildlife Sanctuary, Maharashtra             |
| 2.    | N 19.436688, E 72.917619 | 507              | Tungareshwar Road, Usgaon, Maharashtra        | Tungareshwar Wildlife Sanctuary                          |
| 3.    | N 19.432964, E 72.917324 | 468              | Tungareshwar Road, Usgaon, Maharashtra        | Tungareshwar Wildlife Sanctuary                          |
| 4.    | N 19.433691, E 72.920631 | 460              | Tungareshwar Road, Usgaon, Maharashtra        | Tungareshwar Wildlife Sanctuary                          |
| 5.    | N 19.447794, E 72.954448 | 100              | Tungareshwar Road, Usgaon, Maharashtra        | Tungareshwar Wildlife Sanctuary                          |
| 6.    | N 19.401387, E 72.978545 | 100              | Tungareshwar Road, Usgaon, Maharashtra        | Tungareshwar Wildlife Sanctuary                          |
| 7.    | N 19.1498559, E 73.528431| 277              | Sidhgad, Maharashtra                         | Shri Bhimashankar Jyotirlinga Wildlife Reserve           |
| 8.    | N 19.152012, E 73.529095 | 500              | Sidhgad, Maharashtra                         | Shri Bhimashankar Jyotirlinga Wildlife Reserve           |
| 9.    | N 19.033822, E 73.297659 | 230              | Komal Wadi, Neral, Maharashtra               |                                                         |
| 10.   | N 19.437811, E 72.920842 | 220              | Jummapatti, Neral, Maharashtra               |                                                         |
| 11.   | N 18.772724, E 73.374103 | 500              | Tiger Valley Forest, Lonavla, Maharashtra     |                                                         |
| 12.   | N 18.750758, E 73.395499 | 600              | Thombrewadi, Lonavla, Maharashtra            |                                                         |
| 13.   | N 18.641368, E 73.408884 | 710              | Devghar, Aamby Valley City, Maharashtra      |                                                         |
| 14.   | N 16.380903, E 73.799371 | 200              | Phondaghat, Kankavli, Maharashtra            | Dajipur Wildlife Sanctuary                              |
| 15.   | N 15.928689, E 73.985662 | 750              | Kegad, Maharashtra                          |                                                         |
| 16.   | N 15.935044, E 73.993494 | 730              | Kegad, Maharashtra                          |                                                         |
| 17.   | N 15.970457, E 74.019934 | 755              | Amboli, Sindhudurg, Maharashtra, Terwan, Maharashtra |                                                         |
| 18.   | N 15.790660, E 74.108455 | 100              | Terwan, Maharashtra                         |                                                         |
| 19.   | N 15.819029, E 74.086618 | 400              | Terwanmedhe, Maharashtra                    |                                                         |
| 20.   | N 15.814250, E 74.125741 | 200              | Bambarde, Maharashtra                       |                                                         |
| 21.   | N 15.654184, E 74.090422 | 600              | Virdi, Maharashtra                         |                                                         |
| 22.   | N 18.641368, E 73.408884 | 710              | Devghar, Maharashtra                       |                                                         |
| 23.   | N 18.782275, E 73.370418 | 500              | Battery Hills, Lonavla                       |                                                         |
| No. | Latitude  | Longitude | Distance (Km) | Village/Location                                      | Location Description                  |
|-----|-----------|-----------|---------------|-------------------------------------------------------|----------------------------------------|
| 24. | N 16.891528, E 73.659881 | 200       | Palu, Maharashtra | Chandoli National Park                               |
| 25. | N 16.745414, E 73.740320 | 200       | Karavali, Maharashtra | Chandoli National Park                               |
| 26. | N 17.630953, E 73.202066 | 150       | Agar Vaigani, Dapoli, Maharashtra                      |
| 27. | N 17.889646, E 73.156420 | 185       | Dauli, Dapoli, Maharashtra                             |
| 28. | N 17.849028, E 73.227139 | 111       | Dhankoli, Dapoli, Maharashtra                          |
| 29. | N 17.729611, E 73.169556 | 157       | Gavhe, Dapoli, Maharashtra                             |
| 30. | N 17.907389, E 73.128389 | 231       | Vanzloli, Dapoli, Maharashtra                          |
| 31. | N 17.410861, E 73.564333 | 140       | Kudap, Dapoli, Maharashtra                             |
| 32. | N 17.543306, E 73.709806 | 174       | Nandivase, Dapoli, Maharashtra                         |
| 33. | N 17.523444, E 73.673222 | 134       | Ovali, Dapoli, Maharashtra                             |
| 34. | N 17.589311, E 73.668926 | 150       | Tivare, Dapoli, Maharashtra                            |
| 35. | N 17.574476, E 73.696630 | 409       | Tivadi, Dapoli, Maharashtra                            |
| 36. | N 17.258917, E 73.428667 | 71        | Vir, Dapoli, Maharashtra                              |
| 37. | N 17.840889, E 73.475111 | 219       | Dahivali, Khed, Maharashtra                           |
| 38. | N 17.847222, E 73.460889 | 225       | Ghogare, Khed, Maharashtra                            |
| 39. | N 17.601028, E 73.649722 | 165       | Kuravalkhed(Gavthan), Khed, Maharashtra               |
| 40. | N 17.783139, E 73.545000 | 96        | Nandivali, Khed, Maharashtra                          |
| 41. | N 17.635886, E 73.664835 | 162       | Sapiirli, Khed, Maharashtra                           |
| 42. | N 17.648111, E 73.598417 | 228       | Talavat pal, Khed                                     |
| 43. | N 17.831951, E 73.535200 | 197       | Vadgaon Kh., Khed, Maharashtra                        |
| 44. | N 16.782472, E 73.656833 | 88        | Aargaon, Lanja, Maharashtra                           |
| 45. | N 16.807556, E 73.468750 | 146       | Bapere, Lanja, Maharashtra                            |
| 46. | N 16.862667, E 73.525167 | 144       | Devrai, Lanja, Maharashtra                            |
| 47. | N 16.815566, E 73.670252 | 122       | Hardakhale, Lanja, Maharashtra                        |
| 48. | N 16.849139, E 73.469056 | 114       | Kante, Lanja, Maharashtra                             |
| 49. | N 16.871596, E 73.731361 | 171       | Khorninko, Lanja, Maharashtra                        |
| 50. | N 16.943600, E 73.682479 | 115       | Kochari, Lanja, Maharashtra                           |
| 51. | N 16.788167, E 73.436306 | 119       | Panore, Lanja, Maharashtra                            |
| No. | Latitude  | Longitude  | Location                        |
|-----|-----------|------------|----------------------------------|
| 52  | N 16.906806, E 73.489417 | 167 | Punas, Lanja, Maharashtra        |
| 53  | N 16.775972, E 73.691583  | 113 | Ringane, Lanja, Maharashtra     |
| 54  | N 16.925712, E 73.654901  | 56  | Salpe, Lanja, Maharashtra       |
| 55  | N 16.799989, E 73.539606  | 135 | Vangule, Lanja, Maharashtra     |
| 56  | N 16.781722, E 73.605056  | 81  | Vilavade, Lanja, Maharashtra    |
| 57  | N 16.781778, E 73.604056  | 79  | Vilavade, Lanja, Maharashtra    |
| 58  | N 16.785554, E 73.627272  | 85  | Vhel, Lanja, Maharashtra        |
| 59  | N 17.051599, E 73.392442  | 144 | Bhoke, Ratnagiri, Maharashtra   |
| 60  | N 16.970806, E 73.501361  | 171 | Khanu, Ratnagiri, Maharashtra   |
| 61  | N 17.002550, E 73.454284  | 200 | Mirjole, Ratnagiri, Maharashtra |
| 62  | N 17.018372, E 73.305343  | 22  | Shirgaon, Ratnagiri, Maharashtra|
| 63  | N 17.134935, E 73.400793  | 157 | Taraval, Ratnagiri, Maharashtra |
| 64  | N 16.656733, E 73.593877  | 175 | Angale, Ratnagiri, Maharashtra  |
| 65  | N 16.681087, E 73.812778  | 199 | Kajirda, Ratnagiri, Maharashtra |
| 66  | N 16.738599, E 73.757579  | 132 | Karavali, Ratnagiri, Maharashtra|
| 67  | N 16.737379, E 73.758549  | 136 | Karavali, Ratnagiri, Maharashtra|
| 68  | N 16.736861, E 73.760028  | 136 | Karavali, Ratnagiri, Maharashtra|
| 69  | N 16.737694, E 73.759083  | 136 | Karavali, Ratnagiri, Maharashtra|
| 70  | N 16.622333, E 73.678278  | 52  | Kelavali, Ratnagiri, Maharashtra|
| 71  | N 16.676533, E 73.525729  | 99  | Kodavali, Ratnagiri, Maharashtra|
| 72  | N 16.745535, E 73.570645  | 130 | Mandrul, Ratnagiri, Maharashtra|
| 73  | N 16.743333, E 73.570639  | 135 | Mandrul, Ratnagiri, Maharashtra|
| 74  | N 16.665250, E 73.779500  | 90  | Moor, Ratnagiri, Maharashtra    |
| 75  | N 16.622882, E 73.490317  | 44  | PangareKd., Ratnagiri, Maharashtra|
| 76  | N 16.708042, E 73.698643  | 55  | Rayapatan, Ratnagiri, Maharashtra|
| 77  | N 16.708361, E 73.696333  | 55  | Rayapatan, Ratnagiri, Maharashtra|
| No. | Lat  | Long  | Location Description                                      |
|-----|------|-------|-----------------------------------------------------------|
| 78  | 16.696278 | 73.797056 | Val vad, Ratnagiri, Maharashtra                           |
| 79  | 16.747283 | 73.777524 | Yerdav, Ratnagiri, Maharashtra                           |
| 80  | 16.743000 | 73.777750 | Yerdav, Ratnagiri, Maharashtra                           |
| 81  | 17.048778 | 73.710250 | Angavali, Sangameshwar, Maharashtra                      |
| 82  | 17.166111 | 73.667389 | Devole turf prachtigad, Sangameshwar, Maharashtra        |
| 83  | 17.123861 | 73.633500 | Katavali, Sangameshwar, Maharashtra                      |
| 84  | 17.032427 | 73.779613 | Kolwan khadi, Sangameshwar, Maharashtra                  |
| 85  | 16.972861 | 73.659389 | Medhe, Sangameshwar, Maharashtra                         |
| 86  | 16.966833 | 73.758167 | Murshi, Sangameshwar, Maharashtra                        |
| 87  | 17.079164 | 73.698277 | Nigudwadi, Sangameshwar, Maharashtra                     |
| 88  | 17.002111 | 73.772417 | Ninave, Sangameshwar, Maharashtra                        |
| 89  | 17.072250 | 73.685083 | NiveKd., Sangameshwar, Maharashtra                       |
| 90  | 17.014972 | 73.780361 | OzareBk., Sangameshwar, Maharashtra                      |
| 91  | 17.061611 | 73.707056 | Sonarwadi, Sangameshwar, Maharashtra                     |
| 92  | 17.096403 | 73.643780 | Talvade turf Deorukh, Sangameshwar, Maharashtra          |
| 93  | 17.105858 | 73.684180 | Tamnale, Sangameshwar, Maharashtra                       |
| 94  | 17.205917 | 73.656806 | Tivare, Sangameshwar, Maharashtra                        |
| 95  | 15.526692 | 74.241452 | Pendral, Goa                                            |
| 96  | 15.367706 | 74.294722 | Caranzol, Goa                                           |
| 97  | 15.389209 | 74.227162 | Mollem, Goa                                             |
| 98  | 12.140862 | 75.851904 | Kodagu, Karnataka                                        |
In the revision of the southeast Asian genus *Sageraea* (Annonaceae) during the year 1997 by Heusden, they reported 9 species from Western India (Western Ghats), Sri Lanka, In-Indonesia, and the Philippines. The type specimen of *S. laurina* Dalzell was reported by Hooker’s in J. Bot. Kew Gard. Misc. 3: 207 (1851) from India. They mentioned this plant population distribution range is only in Western India (Maharashtra, Karnataka, and Tamil Nadu), but they did not mention other localities such as Goa and Kerala. During the survey, we reported that localities from Goa and Kerala. *S. laurina* is distributed in the northern ranges of the Western Ghats and it's coming under the rare, endemic, and endangered category of the Annonaceae family [22]. This species was reported from Goa state as an endemic species but, they did not mention GPS localities [23]. Based on the tropical plant’s database *S. laurina* is distributed only in the Western Ghats of India. Studied plant population distributed in whole Western Ghats range i.e Northern Western Ghats, Central Western Ghats and Southern Western Ghats of India. It is endemic to the Western Ghats ranges of India [24]. During the survey, we also reported this plant species' distribution range is the Western Ghats of India. Map showing the distribution of *S. laurina* in Northern

| No. | Latitude  | Longitude  | Place Name and Districts | Location |
|-----|-----------|------------|--------------------------|----------|
| 101 | N 14.914552, E 74.235619 | 400 | Madkarni, Karnataka | Cotigao Wildlife Sanctuary |
| 102 | N 11.490970, E 76.237772 | 200 | Elampalari Hills, Tandamkallu, Kerala | New Amarambalam Wildlife Sanctuary |
| 103 | N 11.425777, E 76.398297 | 790 | Malappuram, Kerala | New Amarambalam Wildlife Sanctuary |
| 104 | N 10.491544, E 76.441744 | 600 | Thrissur, Kerala | Peechi-Vazhani Wildlife Sanctuary |
| 105 | N 10.331830, E 76.675505 | 800 | Pariyaram, Kerala | Sholayar Reserve Forest |
| 106 | N 10.348241, E 76.661018 | 800 | Pariyaram, Kerala | Sholayar Reserve Forest |
| 107 | N 10.232185, E 76.703193 | 200 | Ayyampuzha, Kerala | Idamalayar Reserve Forest, Pariyaram |
| 108 | N 10.211680, E 76.632565 | 200 | Ayyampuzha, Kerala | Idamalayar Reserve Forest, Pariyaram |
| 109 | N 9.400565, E 77.004888 | 400 | Perunad, Kerala | Goodrical Forest Range |
| 110 | N 9.409181, E 77.044156 | 400 | Pathanamthitta, Kerala | |
| 111 | N 9.418844, E 77.067931 | 300 | Sabarimala, Kerala | |
| 112 | N 9.395689, E 77.117657 | 350 | Mlappara, Kerala | |
| 113 | N 8.857936, E 77.096188 | 200 | Kollam, Kulathupuzha, Kerala | Shendurney Wildlife Sanctuary |
| 114 | N 8.871412, E 77.109580 | 600 | Kollam, Kulathupuzha, Kerala | Shendurney Wildlife Sanctuary |
| 115 | N 11.470488, E 76.425666 | 850 | Nilgiris, Nadugani, Tamil Nadu | Mudumalai National Park |
| 116 | N 10.550112, E 76.849014 | 1000 | Coimbatore, Chemmanampathy, Tamil Nadu | Aalliyar Reserve Forest |
| 117 | N 8.933248, E 77.217446 | 400 | Puliyarai R.F. Part, Tamil Nadu | Shendurney Wildlife Sanctuary |
| 118 | N 8.918632, E 77.280703 | 320 | Courtallam, Tamil Nadu | Shendurney Wildlife Sanctuary |
Western Ghats but during the present survey, in our result, this plant population covered the whole Western Ghats of India. During the survey, this plant population distribution was noted using locality as well as GPS locality. Already studied vegetation sites with a smaller number of localities reported but they did not report with GPS map. During the survey, we grab both types of data with more localities as well as GPS maps. Very a much smaller number of herbariums were deposited in the Western Circle of BSI, Pune and ARI, Pune. When we explore that locality by using localities, we found some localities get destroyed by deforestation. New localities were noted using the GPS map technique. About 81% of localities explore in Maharashtra State by using Primary data collection in that physical localities are noted as well as GPS localities also noted. About 11%, 3%, 3%, and 2% gather secondary data from Kerala, Goa, Tamil Nadu and Karnataka respectively. In a previous study, some localities of Western Ghats were noted only based on physical parameters, they did not mention the GPS map technique. During the study, we reported this plant vegetation population majorly from reserved forest areas such as Tungareshwar Wildlife Sanctuary, Shri Bhimashankar Jyotirlinga Wildlife Reserve, Dajpur Wildlife Sanctuary Chandoli National Park, Bhimgad Wildlife Sanctuary, Molem wildlife sanctuary, Brahmagiri Wildlife Sanctuary, Cotigao Wildlife Sanctuary, New Amarambalam Wildlife Sanctuary, Peechi-Vazhani Wildlife Sanctuary, Sholayar Reserve Forest, Idamalayar Reserve Forest, Goodrical Forest Range, Shendurney Wildlife Sanctuary, Mudumalai National Park, Aalliyar Reserve Forest and Shendurney Wildlife Sanctuary. In previous study sites of reserved forests such as Shri Bhimashankar Jyotirlinga Wildlife Reserve, Chandoli National Park and Mudumalai National Park.

CONCLUSIONS
In the present study, We generate and gather primary and secondary data to stand a species in the improve the IUCN category i.e. IUCN status will be changed from lower risk/near threatened to least concern status. Generated primary and secondary data used for conservation (in situ & ex-situ conservation) of this species. The major goal of the species recovery programme will be to re-establish the populations within their natural habitat. Considering these facts the study area is significant concerning floristic diversity in the Western Ghats. The present survey of this plant will provide future strategies to improve conservation strategies. Using various schemes (Government and non-government) of conservation, this plant's IUCN status will change from lower risk/near threatened to least concern status.

CONTRIBUTION OF AUTHORS
Research concept- Balasaheb S. Kale
Research design- Dr. Sanjay A. Khairnar
Supervision- Dr. Sanjay A. Khairnar
Materials- Balasaheb S. Kale
Data collection- Balasaheb S. Kale
Data analysis and Interpretation- Balasaheb S. Kale
Writing article- Balasaheb S. Kale
Critical review- Balasaheb S. Kale
Article editing- Balasaheb S. Kale
Final approval- Dr. Sanjay A. Khairnar

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