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# A Preliminary Checklist on the Lichen Flora of Agasthyamalai Biosphere Reserve, Kerala, India

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**ABSTRACT**

Lichens are one of the critical components of the Indian flora. The vast topographical and climatic diversity of ecologically interesting areas in India has gifted with a rich lichen flora, both in variety and abundance. Many areas are still unexplored for their lichen wealth. In Kerala, the listing of lichens has not received much attention in comparison with other lower groups of plants. Although there have been lichen explorations in the Kerala state, no prominent records from Agasthyamalai Biosphere Reserve are available. Agasthyamalai Biosphere Reserve includes three Wildlife Sanctuaries, Neyyar, Peppara and Shendurney and their adjoining areas of Braemore, Ponmudi, Achencoil, Thenmala, Rosemala, Konni, Punalur, and one Tiger Reserve - Kallakad Mundantharai (KMTR) in Tamil Nadu and only fragmentary work has been done in the study of lichens from this part of Western Ghats. This paper enumerates the occurrence of 147 species of both macro and micro lichens from Thiruvananthapuram and Kollam districts in the Kerala part of Agasthyamalai Biosphere Reserve, based on a field survey to assess the lichen diversity of the area.

## INTRODUCTION

Lichens are one of the important constituents of the Indian biodiversity. The vast topographical and climatic diversity has endowed it with a rich lichen biota, both in luxuriance and diversity. Despite the intense efforts in exploration and survey during the last seven decades, our knowledge about lichens from different phytogeographic regions of India is incomplete, as many areas are still unexplored for their lichen wealth (Upreti *et al*. 2015). The Western Ghats is internationally known for its biological diversity. It comprises a series of mountainous areas parallel to India's western coast stretching over 1,600 km across the states of Kerala, Tamil Nadu, Karnataka, Goa, Maharashtra, and Gujarat, with approximately 30 to 50 km inland with a break at Palghat region. They are particularly vital to their endemism and have been listed as one of the eight hotspots of biological diversity globally. In the world, about 20,000 lichens are known, while India, one of the lichen-rich countries, constitutes about 15% of the world's lichen flora, represented by 2,985 species under 469 genera and 88 families (Sinha 2021).

The Agasthyamalai Biosphere Reserve (ABR) is a UNESCO world biosphere reserve located in the Southern Western Ghats, established in 2001 and includes 3,500.36 km$^2$, out of which 1828 km$^2$ is in Kerala and 1672.36 km$^2$ is in Tamil Nadu. Agasthyamalai is located in this biosphere area. This biosphere reserve straddles the border of Pathanamthitta, Kollam and Thiruvananthapuram districts in Kerala and Tirunelveli and Kanyakumari districts in Tamil Nadu, South India, at the southern end of the Western Ghats. Agasthyamalai Biosphere Reserve includes three Wildlife Sanctuaries, Neyyar, Peppara and Shendurney and their adjoining areas of Braemore, Ponmudi, Achencoil, Thenmala, Rosemala, Konni, Punalur, and one Tiger Reserve - Kallakad Mundantharai (KMTR) in Tamil Nadu. The elevation level range in ABR is from 100 to 2000 m. The windward side of ABR receives 2000 to 5000 mm of precipitation, in contrast to the leeward side, which receives between 900 to 2000 mm of precipitation (Dutta *et al*. 2016). Shendurney WLS is located in Kollam District and is in the Kerala portion of ABR, although the region is contiguous with the Tamil Nadu KMTR forests where the species assemblage is likely to be similar. Shendurney covers an area of 172 km$^2$ and primarily consists of tropical evergreen and semi-evergreen forests, but also has some moist deciduous and hilltop tropical evergreen forests. Ponmudi is a small hill station that is also part of ABR. The habitat surrounding Ponmudi is a mix of valleys and

hills with forests and plantations (Sondhi *et al.,* 2018). The Biosphere Reserve is more productive in terms of biomass and provides a special microclimatic habitat for a wide variety of biota. A number of tribal settlements are located in the core area of the biosphere. Non-tribal families are also living in the fringe area of the forests. They are heavily dependent on the reserve resources for their daily life. They derive a wide variety of biological resources for their sustenance and are rarely involved in commercialization. The unique biogeography of the region is still holding on to its tenuous character with its diverse and plentiful resource base. Therefore, the situation warrants careful monitoring and scientific management. As such, the biosphere provides an ample opportunity to explore and demonstrate approaches for environmentally compatible and ecologically sustainable development. The biogeography of the reserve is unique in sharing common flora and fauna elements between India and Sri Lanka. The area harbors a rich diversity in terms of species content, ecosystems, habitats and cultural grounds. The biosphere is a treasure house of plant diversity with about 2254 species of flowering plants, of which 405 species are endemic to the Western Ghats. Among these 19 newly described and 58 are under the threatened category as per IUCN. In addition, 600 medicinal plants and more than 100 economically important species occur in this area. Agasthyamalai Biosphere Reserve is a pristine paleotropic region with a very high floral endemism and tremendously rich biodiversity, locked up in an area exhibiting an overall representation of the biota of southern Western Ghats. Prior to this, a study conducted by Kumar and Sequeira (2008) revealed the occurrence of 36 species of macro lichens from Neyyar Wildlife Sanctuary, which is also a part of the Agasthyamalai Biosphere Reserve.

## MATERIALS AND METHODS

The present study is based on the examination of more than 350 lichen specimens collected from different forest localities of Agasthyamalai Biosphere Reserve during the period of 2006 - 2010.(Fig 1) The identification of all the taxa was done by studying their morphology, anatomy and chemistry and also referring to the keys and standard descriptions available from the literature (Awasthi 2007; Bajpai *et al.* 2017, 2018; Biju *et al.* 2021; Divakar and Upreti 2005; Joshi *et al.* 2012, 2018; Mishra *et al.* 2011; Tewari 2007). Identified materials were also matched with types, exsiccates and well-identified materials housed at lichen herbarium LWG of CSIR-National Botanical Research Institute, Lucknow, Uttar Pradesh. The morphological details were examined using a stereo zoom Magnus MLX Plus microscope, while anatomical details were studied using Leica DM2000 optical microscopes attached with camera and image analysis software. Spot tests studied the chemistry and thin-layer chromatography was performed in solvent system C following Orange *et al.* (2001). Wijayawardene *et al.* (2020) were followed for the classification of lichens. After confirming the identity of the species, the specimens were deposited at the regional herbarium of Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Thiruvananthapuram, Kerala under TBGT, Kerala Forest Research Institute, Peechi under KFRI, and a set of voucher specimens are housed at the herbarium of National Botanical Research Institute, Lucknow under LWG.

## RESULTS AND DISCUSSION

The study resulted in recording 147 species (Table 1) of both macro and micro lichens under 65 genera from various

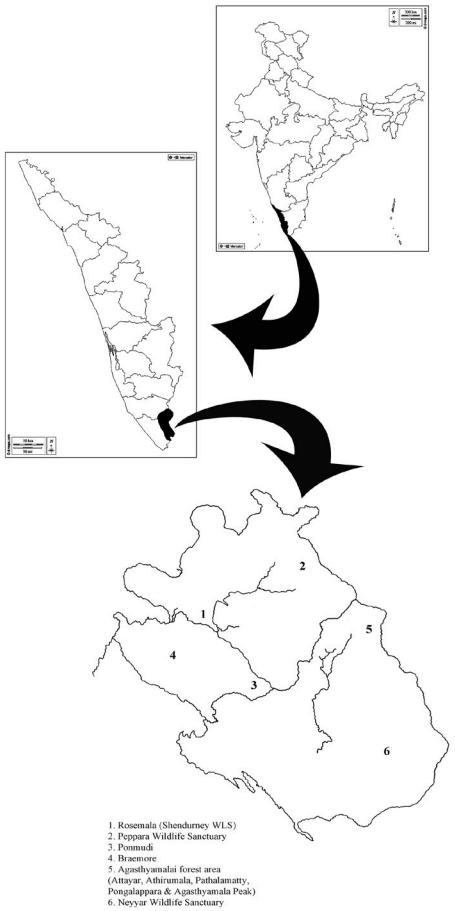


Fig. 1: Map showing collection localities in the Agasthyamalai Biosphere Reserve

Table 1: Distribution of lichens in various localities of Agasthyamalai Biosphere Reserve with their growth forms

| No. | Lichen species | Growth form | Collection localities | | | | | | Herbarium accession numbers |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| Arthoniaceae | | | | | | | | | |
| 1. | *Cryptothecia dissimilis* Makhija & Patw. | Cr | - | - | - | - | + | - | LWG 06-008494, TBGT 1118 |
| 2. | *Cryptothecia lunulata* (Zahlbr.) Makhija & Patw. | Cr | + | - | - | - | + | - | TBGT 213 |
| 3. | *Cryptothecia polymorpha* Makhija & Patw. | Cr | + | - | - | - | - | - | LWG 06-008481, TBGT 782 |
| 4. | *Cryptothecia obtecta* Makhija & Patw. | Cr | + | - | - | - | + | - | LWG 06-009887 |
| 5. | *Cryptothecia scripta* G. Thor | Cr | + | - | - | - | - | - | LWG 06-009471 |
| 6. | *Cryptothecia striata* G. Thor | Cr | + | - | - | - | - | - | LWG 06-009558 |
| 7. | *Cryptothecia subtecta* Stirt. | Cr | - | - | - | - | + | - | TBGT 1078 |
| 8. | *Herpothallon echinatum* Aptroot, Lücking & Will-Wolf | Cr | - | + | + | - | - | - | LWG 06-009555 |
| 9. | *Herpothallon granulare* (Sipman) Aptroot & Lücking | Cr | + | - | - | - | - | - | LWG 06-009532 |
| 10. | *Herpothallon granulosum* Jagad. Ram & G. P. Sinha | Cr | - | + | - | - | - | - | LWG 06-009552 |
| 11. | *Herpothallon philippinum* (Vain.) Aptroot & Lücking | Cr | - | + | - | - | + | - | LWG 06-009882 |
| Caliciaceae | | | | | | | | | |
| 12. | *Buellia confusa* D. D. Awasthi | Cr | - | - | - | - | + | - | LWG 06-008461, TBGT 831 |
| 13. | *Pyxine cocoes* (Sw.) Nyl. | F | - | - | - | - | + | - | LWG 06-008382, TBGT 794 |
| 14. | *Pyxine meissnerina* Nyl. | F | - | - | + | - | + | - | LWG 06-008393, TBGT 1332 |
| Candelariaceae | | | | | | | | | |
| 15. | *Candelaria concolor* (Dicks.) Arnold | F | - | + | - | - | - | - | LWG 06- 007577, TBGT 208b |
| Chrysotrichaceae | | | | | | | | | |
| 16. | *Chrysothrix chlorina* (Ach.) J. R. Laundon | Cr | + | - | - | - | - | - | LWG 06-008392, TBGT 1173 |
| Cladoniaceae | | | | | | | | | |
| 17. | *Cladonia cartilaginea* Müll. Arg. | Fr | - | + | - | - | - | - | LWG 06-007521, TBGT 617 |
| 18. | *Cladonia corymbescens* (Nyl.) Nyl. | Fr | - | - | - | + | - | - | LWG 06-008167, TBGT 493 |
| 19. | *Cladonia fenestralis* Nuno | Fr | - | - | - | + | - | - | LWG 06-008315, TBGT 1305 |

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|---|---|---|---|---|---|---|---|---|---|
| 20. | *Cladonia ramulosa* (With.) J. R. Laundon | Fr | - | - | - | + | - | - | KFRI s. n. |
| 21. | *Lepraria caesioalba* (B. de Lesd.) J. R. Laundon | Cr | - | - | + | - | - | - | LWG 06-009468 |
| 22. | *Lepraria elobata* Tønsberg | Cr | + | - | - | - | - | - | LWG 06-009499 |
| Coccocarpiaceae | | | | | | | | | |
| 23. | *Coccocarpia erythroxyli* (Spreng.) Swinscow & Krog | F | - | - | - | + | - | - | LWG 06-008164, TBGT 488 |
| 24. | *Coccocarpia palmicola* (Spreng.) Arv. & D.J. Galloway | F | - | - | - | + | - | - | LWG 06-008358, TBGT 1540 |
| 25. | *Coccocarpia pellita* (Ach.) Müll. Arg. | F | - | - | - | + | - | - | LWG 06-008070, TBGT 224 |
| Collemataceae | | | | | | | | | |
| 26. | *Collema glaucophthalmum* Nyl. | F | - | - | - | + | - | - | KFRI s. n. |
| 27. | *Leptogium burgessii* (L.) Mont. | F | - | - | - | + | - | - | KFRI s. n. |
| 28. | *Leptogium chloromelum* (Ach.) Nyl. | F | - | - | - | - | - | + | KFRI s. n. |
| 29. | *Leptogium cyanescens* (Ach.) Körb. | F | - | - | - | + | - | - | KFRI s. n. |
| 30. | *Leptogium denticulatum* Nyl. | F | + | - | - | + | - | + | LWG 06-007958, TBGT 1136, KFRI s. n. |
| 31. | *Leptogium phyllocarpum* (Pers.) Mont. | F | + | - | - | - | + | - | LWG 06-007938, TBGT 1158 |
| 32. | *Leptogium ulvaceum* (Pers.) Vain. | F | - | - | - | + | - | - | LWG 06-008135, TBGT 379 |
| 33. | *Scytinium gelatinosum* (With.) Otálora, P. M. Jørg. & Wedin | F | - | - | - | + | - | - | KFRI s. n. |
| Diploschistaceae | | | | | | | | | |
| 34. | *Asteristion alboolivaceum* (Vain.) I. Medeiros, Lücking & Lumbsch | Cr | + | - | - | + | - | - | TBGT 1207 |
| 35. | *Glaucotrema glaucophaenum* (Kremp.) Rivas Plata & Lumbsch | Cr | - | - | - | + | - | - | LWG 06–009587 |
| 36. | *Myriotrema clandestinum* (Fée) Hale | Cr | + | - | - | - | + | - | LWG 06–009586, TBGT 1131 |
| 37. | *Myriotrema compunctum* (Ach.) Hale | Cr | - | - | - | - | + | - | TBGT 539 |
| 38. | *Myriotrema subconforme* (Nyl.) Hale | Cr | - | - | - | + | + | - | LWG 06–009588, TBGT 839 |
| 39. | *Ocellularia albomaculata* Hale | Cr | - | - | - | - | + | - | TBGT 801 |
| 40. | *Ocellularia allosporoides* (Nyl.) Patw. & Kulk. | Cr | - | - | + | - | + | - | LWG 06 –009581 |
| 41. | *Ocellularia eumorpha* (Stirt.) Hale | Cr | + | - | - | - | + | - | TBGT 1123 |
| 42. | *Ocellularia keralensis* Patw. & C.R. Kulk. ex Hale | Cr | - | - | - | + | - | - | TBGT 575 |
| 43. | *Ocellularia papillata* (Leight.) Zahlbr. | Cr | + | - | - | - | - | - | LWG 06-007605, TBGT 87a |

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|---|---|---|---|---|---|---|---|---|---|
| 44. | *Ocellularia pertusariiformis* (Leight.) Zahlbr. | Cr | - | - | - | - | + | - | TBGT 746 |
| 45. | *Ocellularia subperforata* Nagarkar, Sethy & Patw. | Cr | + | - | - | - | - | - | LWG 06–009592 |
| 46. | *Ocellularia thelotremoides* (Leight.) Zahlbr. | Cr | - | - | - | - | + | - | LWG 06–009626 |
| 47. | *Ocellularia upretii* S. Joshi, Divakar, Lumbsch & Lücking | Cr | - | - | + | - | + | - | LWG 06–009576 |
| 48. | *Reimnitzia santensis* (Tuck.) Kalb | Cr | - | - | - | - | + | - | TBGT 798 |
| 49. | *Rhabdodiscus asiaticus* (Vain.) Rivas Plata, Lücking & Lumbsch | Cr | + | - | - | + | - | - | LWG 06–009573 |
| 50. | *Rhabdodiscus marivelensis* (Vain.) Rivas Plata, Lücking & Lumbsch | Cr | + | - | - | + | - | - | LWG 06–009684, TBGT 1162 |
| 51. | *Stegobolus fissus* (Müll. Arg.) Frisch | Cr | - | + | - | + | - | - | TBGT 432 |
| 52. | *Wirthiotrema desquamans* (Müll. Arg.) Lücking | Cr | - | - | - | + | - | - | TBGT 468 |
| 53. | *Wirthiotrema glaucopallens* (Nyl.) Rivas Plata & Kalb | Cr | - | - | - | - | + | - | LWG 06–009627 |
| Fissurinaceae | | | | | | | | | |
| 54. | *Fissurina* sp. | Cr | + | - | + | + | - | - | LWG 06-008442, TBGT 542 |
| Graphidaceae | | | | | | | | | |
| 55. | *Graphis* sp. | Cr | + | - | - | - | - | - | LWG 06-008449, TBGT 1187 |
| 56. | *Graphis anfractuosa* (Eschw.) Eschw. | Cr | - | - | - | - | + | - | 06-008214, TBGT 820 |
| 57. | *Graphis glaucescens* Fée | Cr | + | - | - | - | - | - | LWG 06-008303, TBGT 1142 |
| 58. | *Graphis gonimica* Zahlbr. | Cr | + | - | - | - | - | - | LWG 06-008408, TBGT 1284 |
| 59. | *Graphis leptocarpa* Fée | Cr | + | - | - | - | - | - | LWG 06-008416, TBGT 1213 |
| 60. | *Graphis lineola* Ach. | Cr | + | - | - | - | - | - | LWG 06-008417, TBGT 1231 |
| 61. | *Graphis proserpens* Vain. | Cr | + | - | - | - | + | - | LWG 06-008304, TBGT 1154 |
| 62. | *Graphis scripta* (L.) Ach. | Cr | + | - | - | - | + | - | LWG 06-008302, TBGT 1130 |
| 63. | *Graphis subserpentina* Nyl. | Cr | - | - | + | - | - | - | LWG 06-008325, TBGT 1344 |
| 64. | *Hemithecium lamii (Redinger.)* V. P. Tewari & Upreti | Cr | - | - | - | + | - | - | LWG 06-008403, TBGT 1403 |
| 65. | *Pallidogramme chrysenteron* (Mont.) Staiger, Kalb & Lücking | Cr | - | - | - | + | - | - | LWG 06-008409, TBGT 438 |

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|---|---|---|---|---|---|---|---|---|---|
| 66. | *Pallidogramme chlorocarpoides* (Nyl.) Staiger, Kalb & Lücking | Cr | - | - | + | - | - | - | LWG 06-007995, TBGT 1533 |
| 67. | *Platygramme pudica* (Mont. & Bosch) M. Nakan. & Kashiw. | Cr | - | - | + | - | - | - | LWG 06-007987, TBGT 1293 |
| 68. | *Pseudochapsa phlyctidioides* (Müll. Arg.) Parnmen, Lücking & Lumbsch | Cr | + | - | - | - | - | - | TBGT 1270 |
| 69. | *Pseudochapsa pseudoexanthismocarpa* (Patw. & C. R. Kulk.) Parnmen, Lücking & Lumbsch | Cr | - | - | - | - | + | - | TBGT 808 |
| 70. | *Sarcographa labyrinthica* (Ach.) Müll. Arg. | Cr | + | - | - | - | - | - | LWG 06-008420, TBGT 1232 |
| Letrouitiaceae | | | | | | | | | |
| 71. | *Letrouitia aureola* (Tuck.) Hafellner & Bellem. | Cr | - | - | - | - | + | - | LWG 06-008463, TBGT 718 |
| Malmideaceae | | | | | | | | | |
| 72. | *Malmidea granifera* (Ach.) Kalb, Rivas Plata & Lumbsch | Cr | + | - | - | - | - | - | LWG 06-008460, TBGT 786 |
| Megalosporaceae | | | | | | | | | |
| 73. | *Megalospora sulphurata* Meyen | Cr | - | - | - | + | - | - | LWG 06-008181, TBGT 556 |
| Monoblastiaceae | | | | | | | | | |
| 74. | *Anisomeridium ubianum* (Vain.) R.C. Harris | Cr | - | - | - | - | + | - | LWG 06-008202, TBGT 712 |
| Ophioparmaceae | | | | | | | | | |
| 75. | *Hypocenomyce* sp. | Cr | + | - | + | + | - | - | TBGT 472 |
| Pannariaceae | | | | | | | | | |
| 76. | *Lepidocollema stylophorum* (Vain.) P. M. Jørg | Cr | - | + | - | + | - | - | LWG 07-007611, TBGT 1570, KFRI s. n. |
| Parmeliaceae | | | | | | | | | |
| 77. | *Bulbothrix isidiza* (Nyl.) Hale | F | - | + | - | - | - | - | LWG 06-008056, TBGT 188 |
| 78. | *Bulbothrix tabacina* (Mont. & Bosch) Hale | F | - | + | - | - | - | - | LWG 06-007885, TBGT 1546 |
| 79. | *Hypotrachyna crenata* (Kurok.) Hale | F | - | - | - | + | - | - | KFRI s. n. |
| 80. | *Hypotrachyna degelii* (Hale) Hale | F | - | - | - | + | - | - | KFRI s. n. |
| 81. | *Hypotrachyna sublaevigata* (Nyl. Ex Tuck.) Hale | F | - | - | - | + | - | - | KFRI s. n. |
| 82. | *Myelochroa radiculata* (Kurok.) Divakar & A. Crespo | F | - | - | - | + | - | - | LWG 06- 008170, TBGT 509 |
| 83. | *Myelochroa xantholepis* (Mont. & Bosch) Elix & Hale | F | - | - | - | + | - | - | LWG 06- 007811, TBGT 385, KFRI s. n. |
| 84. | *Parmelinella manipurensis* (Kr. P. Singh) Elix & Hale | F | - | - | - | + | - | - | KFRI s. n. |

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|---|---|---|---|---|---|---|---|---|---|
| 85. | *Parmelinella wallichiana* (Taylor) Elix & Hale | F | - | - | - | + | - | - | LWG 06-008117, TBGT 325, KFRI s. n. |
| 86. | *Parmotrema hababianum* (Gyeln.) Hale | F | - | - | - | + | - | - | KFRI s. n. |
| 87. | *Parmotrema melanothrix* (Mont.) Hale | F | - | + | - | - | - | - | LWG 06-007819, TBGT 616 |
| 88. | *Parmotrema planatilobatum* (Hale) Hale | F | - | - | - | + | - | - | LWG 06-008154, TBGT 457 |
| 89. | *Parmotrema praesorediosum* (Nyl.) Hale | F | + | - | - | - | + | - | LWG 06-008318, TBGT 1324 |
| 90. | *Parmotrema tinctorum* (Despr. ex Nyl.) Hale | F | - | - | - | + | - | - | LWG 06-007815, TBGT 1256 |
| 91. | *Relicina abstrusa* (Vain.) Hale | F | - | - | - | + | - | - | LWG 06-007924, TBGT 531 |
| 92. | *Relicina sydneyensis* (Gyeln.) Hale | F | - | - | - | + | - | - | KFRI s. n. |
| 93. | *Remototrachyna crenata* (Kurok.) Divakar & A. Crespo | F | - | + | - | - | - | - | LWG 05-007912, TBGT 67 |
| 94. | *Remototrachyna infirma* (Kurok.) A. Crespo & Divakar | F | - | - | - | + | - | - | LWG 04-008013, TBGT 47 |
| 95. | *Remototrachyna rhabdiformis* (Kurok.) Divakar & A. Crespo | F | - | - | - | + | - | - | LWG 06-007886, TBGT 630 |
| 96. | *Usnea subchalybaea* Zahlbr. | Fr | - | - | - | + | - | - | KFRI s. n. |
| Peltigeraceae | | | | | | | | | |
| 97. | *Dendriscosticta praetextata* (Räsänen) B. Moncada & Lücking | F | - | - | - | + | - | - | KFRI s. n. |
| 98. | *Lobaria retigera* (Bory) Trevis. | F | - | - | - | + | - | - | KFRI s. n. |
| 99. | *Pseudocyphellaria argyracea* (Delise) Vain. | F | - | - | - | + | - | - | KFRI s. n. |
| 100. | *Sticta cyphellulata* (Müll. Arg.) Hue | F | - | - | - | + | - | - | LWG 06-008155, TBGT 458, KFRI s. n. |
| 101. | *Sticta orbicularis* (A. Braun ex Meyen & Flot.) Vain. | F | - | - | - | + | - | - | KFRI s. n. |
| 102. | *Sticta weigelii* (Ach.) Vain. | F | - | + | - | + | - | - | LWG 07-008371, TBGT 1569 |
| Pertusariaceae | | | | | | | | | |
| 103. | *Pertusaria coronata* (Ach.) Th. Fr. | Cr | - | - | - | + | - | - | TBGT 470 |
| 104. | *Pertusaria punctata* Nyl. | Cr | - | + | - | - | + | - | TBGT 703 |
| 105. | *Pertusaria quassiae* (Fée) Nyl. | Cr | - | - | + | - | + | - | TBGT 1342 |
| Physciaceae | | | | | | | | | |
| 106. | *Heterodermia comosa* (Eschw.) Follmann & Redón | F | - | - | - | + | - | - | LWG 06- 007604, TBGT 1094 |
| 107. | *Heterodermia coronata* (Kurok.) D. D. Awasthi | F | - | - | - | + | - | - | KFRI s. n. |

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|---|---|---|---|---|---|---|---|---|---|
| 108. | *Heterodermia dactyliza* (Nyl.) Swinscow & Krog. | F | - | - | - | + | - | - | LWG 05-007554, TBGT 28, KFRI s. n. |
| 109. | *Heterodermia diademata* (Taylor) D. D. Awasthi | F | - | - | - | + | - | - | LWG 06- 007672, TBGT 864 |
| 110. | *Heterodermia incana* (Stirt.) D. D. Awasthi | F | - | - | - | + | - | - | LWG 06-007584, TBGT 1314, KFRI s. n. |
| 111. | *Heterodermia isidiophora* (Nyl.) D. D. Awasthi | F | - | - | - | + | + | - | LWG 06-007592, TBGT 462 |
| 112. | *Heterodermia pellucida* (D. D. Awasthi) D. D. Awasthi | F | - | - | - | + | - | - | LWG 06-007691, TBGT 984 |
| 113. | *Heterodermia pseudospeciosa* (Kurok.) W. L. Culb. | F | - | + | - | + | - | - | LWG 04-007652, TBGT 52, KFRI s. n. |
| 114. | *Heterodermia rubescens* (Räsänen.) D. D. Awasthi | F | - | - | - | + | - | - | LWG 06-007651, TBGT 473 |
| 115. | *Hyperphyscia granulata* (Poelt) Moberg | F | + | - | - | - | - | - | LWG 06-008305, TBGT 1167 |
| 116. | *Klauskalbia flabellata* (Fée) S. Y. Kondr., Lőkös, E. Farkas & Hur | F | - | - | - | + | - | - | KFRI s. n. |
| 117. | *Leucodermia boryi* (Fée) Kalb | F | - | - | - | + | - | - | LWG 06-007680, TBGT 433, KFRI s. n. |
| 118. | *Physcia tribacia* (Ach.) Nyl. | F | - | - | - | + | - | - | KFRI s. n. |
| 119. | *Polyblastidium japonicum* (M. Satô) Kalb | F | - | - | - | + | - | - | LWG 06-007623, TBGT 965, KFRI s. n. |
| 120. | *Polyblastidium togashii* (Kurok.) Kalb | F | - | - | - | + | - | - | LWG 06-007560, TBGT 203, KFRI s. n. |
| Pilocarpaceae | | | | | | | | | |
| 121. | *Schadonia indica* Upreti & Nayaka | Cr | + | - | - | - | - | - | LWG 06-008480, TBGT 1244 |
| Pycnoraceae | | | | | | | | | |
| 122. | *Pycnora sorophora* (Vain.) Hafellner | Cr | + | + | - | - | + | - | LWG 06-008476, TBGT 1487 |
| Pyrenulaceae | | | | | | | | | |
| 123. | *Pyrenula duplicans* (Nyl.) Aptroot | Cr | - | - | - | - | + | - | LWG 06-008210, TBGT 763 |
| Ramalinaceae | | | | | | | | | |
| 124. | *Bacidina medialis* (Tuck. ex Nyl.) Kistenich, Timdal, Bendiksby & S. Ekman | Cr | - | - | - | + | - | - | LWG 06-008369, TBGT 1566 |
| 125. | *Bacidiopsora psorina* (Nyl.) Kalb | Cr | - | - | - | + | - | + | LWG 06-008464, TBGT 564, KFRI s. n. |
| 126. | *Phyllopsora confusa* Swinscow & Krog | F | - | - | - | + | - | - | LWG 06-009602 |
| 127. | *Phyllopsora manipurensis* (Müll. Arg.) Müll. Arg. | F | - | - | - | + | - | - | LWG 06-009676, TBGT 569 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 128. | *Phyllopsora parvifolia* (Pers.) Müll. Arg. | F | - | - | - | + | - | - | KFRI s.n. |
| Strigulaceae | | | | | | | | | |
| 129. | *Strigula smaragdula* Fr. | Cr | + | - | - | - | - | - | TBGT 1267 |
| Thelotremataceae | | | | | | | | | |
| 130. | *Chapsa hiata* (Hale) Sipman | Cr | - | - | - | + | - | - | TBGT 562 |
| 131. | *Leucodecton anamalaiense* (Patw. & C. R. Kulk.) Rivas Plata & Lücking | Cr | - | - | - | - | + | - | TBGT 729 |
| 132. | *Leucodecton compunctum* (Ach.) A. Massal. | Cr | - | - | - | - | + | - | LWG 06–009582 |
| 133. | *Leucodecton glaucescens* (Nyl.) Frisch | Cr | - | - | - | + | - | - | TBGT 557 |
| 134. | *Leucodecton occultum* (Eschw.) Frisch | Cr | - | - | - | + | - | - | TBGT 538 |
| 135. | *Leucodecton subcompunctum* (Nyl.) Frisch | Cr | - | - | - | + | - | - | LWG 06–009580 |
| 136. | *Thelotrema berkeleyanum* (Mont.) Brusse | Cr | - | + | - | - | - | - | LWG 06–009613 |
| 137. | *Thelotrema canarense* Patw. & C. R. Kulk. | Cr | - | - | - | - | + | - | TBGT 843 |
| 138. | *Thelotrema kamatii* (Patw. & C.R. Kulk.) Hale | Cr | - | - | + | - | + | - | TBGT 1295 |
| 139. | *Thelotrema piluliferum* Tuck. | Cr | - | - | - | + | - | - | TBGT 568 |
| 140. | *Thelotrema subtile* Tuck. | Cr | - | - | - | - | + | - | TBGT 732 |
| Trichotheliaceae | | | | | | | | | |
| 141. | *Porina internigrans* (Nyl.) Müll. Arg. | Cr | - | - | - | + | - | - | LWG 06-008172, TBGT 513 |
| 142. | *Porina rhodostoma* Müll. Arg. | Cr | - | - | + | - | + | - | LWG 06-008319, TBGT 1326 |
| 143. | *Porina subcutanea* Ach. | Cr | + | - | - | + | + | - | LWG 06-008307, TBGT 1242 |
| 144. | *Porina tetracerae* (Ach.) Müll. Arg. | Cr | - | + | + | - | + | - | LWG 06-008136, TBGT 381 |
| Vahliellaceae | | | | | | | | | |
| 145. | *Vahliella leucophaea* (Vahl) P M Jorg | Cr | - | - | - | + | - | - | KFRI s. n. |
| Variolariaceae | | | | | | | | | |
| 146. | *Lepra albescens* (Huds.) Hafellner | Cr | - | - | - | + | - | - | TBGT 902 |
| 147. | *Lepra leucosorodes* (Nyl.) I. Schmitt, B.G. Hodk. & Lumbsch | Cr | - | - | + | - | - | - | TBGT 1311 |

**Collection localities:** 1 - Peppara Wildlife Sanctuary, 2 - Ponmudi, 3 - Braemore, 4 - Agasthyamalai forests, 5 - Rosemala, 6 - Neyyar Wildlife Sanctuary

forest localities in the Peppara Wildlife sanctuary, Ponmudi, Braemore, Athirumala, Pathalamatty, Pongalappara, Agasthyamalai top and Neyyar Wildlife Sanctuary (Kumar and Sequeira 2008) in Thiruvananthapuram district and Rosemala in the Kollam district under the Kerala part of Agasthyamalai Biosphere Reserve. Among them, Diploschistaceae and Parmeliaceae were the dominant families, representing 20 species each,

followed by Graphidaceae (16 spp.), Physciaceae (15 spp.), Arthoniaceae and Thelotremataceae (11 spp. each), respectively. The study area exhibits the maximum diversity of crustose lichens, with 85 species belonging to 39 genera, followed by foliose lichens (57 spp. under 24 genera) and fruticose forms (5 spp. under 2 genera). Among the different localities of the study area, Agasthyamalai and its adjoining forest localities show the maximum diversity of lichens, followed by Rosemala in the Kollam district, Peppara Wildlife Sanctuary, Ponmudi forest areas and Neyyar Wildlife Sanctuary, in the Thiruvananthapuram district.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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