



Documentation of Rare, Endemic and Threatened plants from Nilgiri forest of Southern Western Ghats, Tamil Nadu

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Abstract

The Nilgiri Biosphere Reserve is a part of Southern Western Ghats and a place of incredible diversity in landscape and life. Nilgiri Biosphere Reserve is one of the hot spots of the world with many rare, endemic and threatened plants. The current paper is an attempt to study the conservation assessment of rare, endemic and threatened species (RET) of the Southern Western Ghats. There are 48 flowering plant taxa belonging to 38 genera and 24 families from the Nilgiri District. The Plant list is arranged alphabetically followed by Botanical name, family, habit and habitat, Phenology and its distribution.

Keywords: Documentation, Rare, Endemic, Threatened, Southern Western Ghats.

Introduction

Biodiversity hotspots are areas that support natural ecosystems that are largely intact and where native species and communities associated with these ecosystems. They are also areas with a high diversity of locally endemic species, which are species that not found or are rarely found outside the hotspot. A rare species is one with small population that is not presently endangered but is at risk, an endangered species is one, which is in danger of extinction throughout all or of a significant portion of its range and a threatened species is one, which is likely to become endangered in foreseeable future (Bryde, (1979), Smith, (1980), Nayar and Sastry, (1990).

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(Bryde, (1979), Smith (1980), Nayar and Sastry, (1990). These rare and threatened plants species has to be highlighted for their conservation. According to IUCN an endangered species is a population of organisms which is at risk of becoming extinct because it is either few in numbers. Threatened species is a related term, referring to a species likely to become endangered within the foreseeable future.

The concept of endemism has a long history in biology, dating back to Candolle (1820). In 1882, Engler gave a preliminary idea of endemism and provided one of the first classification of endemics according to their evolutionary age. This classification has been greatly extended and widely used by many botanists (Willis, (1922); Cain, (1944); Favarger and Contandriopoulos, (1961); Stebbin and Major, (1965); Hopper, (1979); Chatterjee, (1939, 1962) was the first researcher who studied the endemism of the Indian flora and evaluated that 6850 species are unique to this

region (61% of flowering plants), of which 3169 species are restricted to the Himalayas and 2045 to Peninsular India (PI). Blasco, (1971) estimated that there are about 1268 dicotyledons endemic to South India; however, Nayar, (1977) recorded 2100 flowering plants endemic to Peninsular India. Later, Nayar, (1980a) reported 141 genera endemic to India; while Ahmedullah & Nayar, (1986) found 55 genera endemic to Peninsular India of which 45 are monotypic (Nayar, 1980a).

Singh and Hajra reported that 5,400 species are endemic out of 17,500 angiospermic species in India (Singh and Hajra, 1996). Western Ghats region is considered as one of the most important biographic zones of India (Nayar, 1982) since it is one of the richest centre of endemism holding 56 genera and 2,000 endemic species. The richness is currently decreasing at an alarming rate as the forests remain unprotected. Approximately ca.654 plant species (mostly flowering plants) are recorded as extinct (WCMC, 1992). A total of 166 endemic taxa, representing 117 genera and 43 families, are known to occur in the Eastern Ghats (EG), of which 129 are dicots and 46 monocots. Sudhakar Reddy & Raju, (2008) recorded 400 endemic spermatophytes from the Eastern Ghats of Andhra Pradesh and their adjacent coastal plains. Afterwards, Betty & Ramachandran, (2014) added 192 taxa belonging to 130 genera and 61 families between the period of 1989 and 2013 based on published sources, unpublished thesis and research reports made by several botanists (Matthew, (1999), Uma Maheshwari & Daniel, (2001) Ramachandran *et al.*, (2006); Manickam, *et al.*, (2008); Viswanathan & Manikandan, (2008); Kabeer & Nair, (2009); Yarrayya, *et al.*, (2015). Out of them, 87 taxa are new to science, as well as endemic to the state of Tamil Nadu.

In India the work on threatened plants was first published in 1980 by the Botanical survey of India (BSI). Jain and Sastry, (1980) published a small booklet entitled "Threatened plants of India." Later a comprehensive work on rare and threatened

plants of India was also published by BSI in the form of a book in three volumes entitled "Red Data Book of Indian Plants" (Nayar and Sastry, (1987, 1988, 1990). And also there are references in the website: <http://www.iucnredlist.org>, or www.iucn.org. IUCN's important and detailed overview of the status of the Indian flora, with special studies of a number of key-areas of biodiversity in India and adjacent Countries has been presented by Davis, *et al.*, (1994, 1995 and 1995a).

The conservation and management of endemic and threatened species have become an important issue in the present study area. Therefore, in line with studies regarding the conservation status, it is an attempt to study the documentation and conservation assessment of rare, endemic and threatened species of the Southern Western Ghats. Some of the species may be lost without receiving any attention. Since most of the southern Western Ghats are located near the human settlements, human disturbance in these forest are progressively increasing. In view of the above facets, the present study was identify the rare, endangered and threatened climbing plants in Southern Western Ghats of Tamil Nadu, India.

Materials and Methods

Study Area

The Nilgiris district is located in the North Western corner of Tamil Nadu state in South India, between 11° 49' 16" N and 76° 73' 37" E, at the junction of the Eastern and Western Ghats, the two prominent mountain ranges that run almost parallel to the two coastlines of Peninsular India. The Nilgiri hills are a range of mountains with at least 24 peaks above 2400 meters in Southern India where states of Tamil Nadu at the junction of Karnataka and Kerala states. The Nilgiri district also the part of 'Nilgiri Biosphere Reserve' (NBR) which is the first biosphere reserve set up in India under the Indian National Man and Biosphere Programme (Figure 1).

Apocynaceae, Aquifoliaceae, Caprifoliaceae, Droseraceae, Elaeocarpaceae, Eriocaulaceae, Lauraceae, Melastomataceae, Orchidaceae, Orobanchaceae, Rosaceae, Symplocaceae and

Urticaceae each one species (Plate 1,2,3,4). The plant species surveyed were represented table 1

Plate - 1



A. *Anaphalis elliptica* DC., B. *Anaphalis leptophylla* (DC.) DC., C. *Youngia nilgiriensis* Babc., D. *Gentiana quadrifaria* Blume, E. *Strobilanthes wightiana* Nees., F. *Senecio lavanduleafolius* DC.

Plate - 2



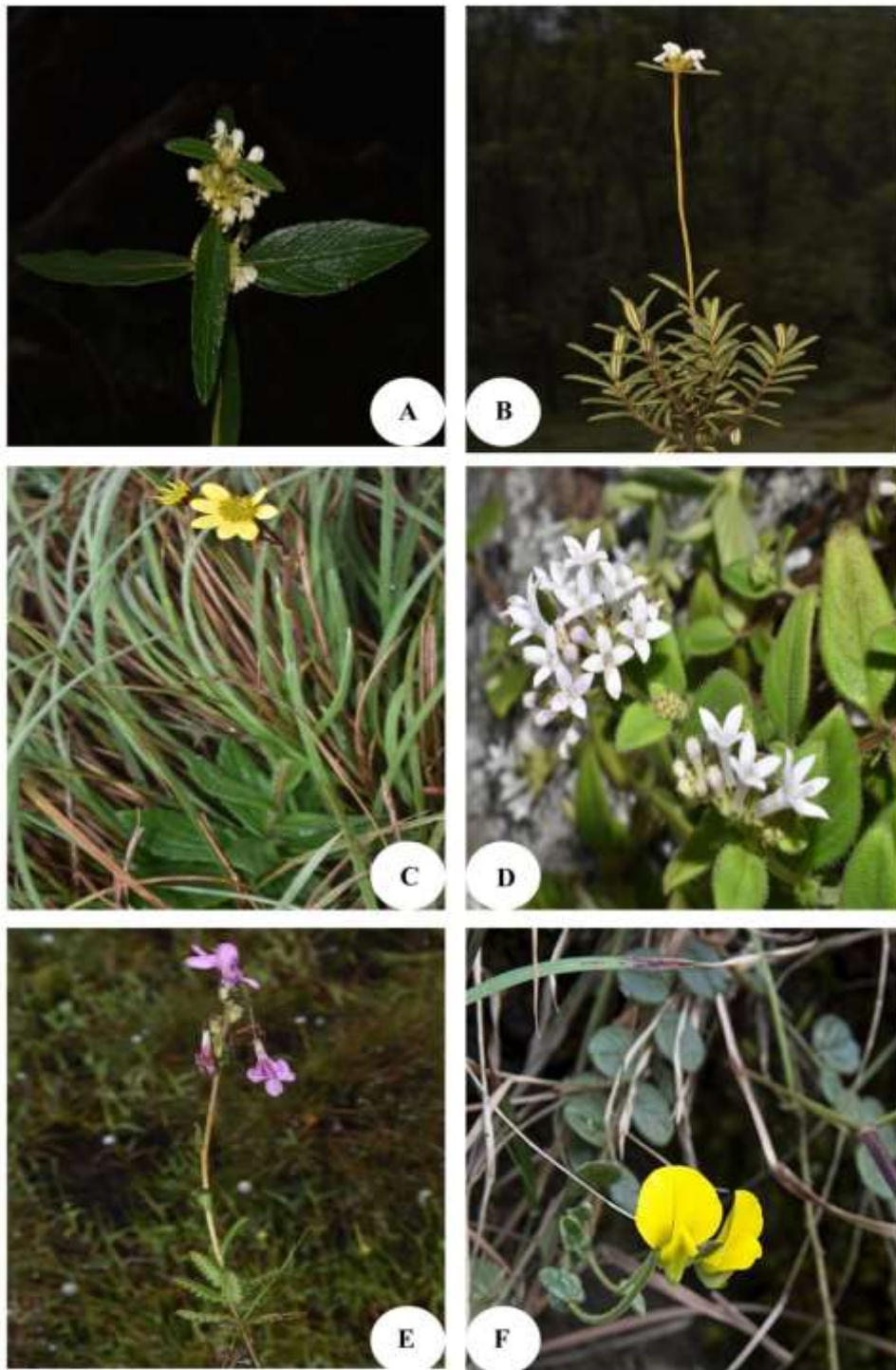
A. *Anaphalis neelgerryana* DC., B. *Anaphalis marcescens* (Wight.) C.B. Clarke,
 C. *Andrographis lawsonii* Gamble., D. *Senecio scandens* Buch. – Ham. ex D. Don,
 E. *Syzygium densiflorum* Wall. ex Wight & Arn. , F. *Microtropis ramiflora* Wight.

Plate - 3



A. *Tylophora multiflora* (Wight & Arn.) Alston, B. *Hedyotis articularis* R.Br. ex Wight & Arn. C. *Liparis atropurpurea* Lindl. D. *Moonia heterophylla* Arn., E. *Drosera peltata* Thunb., F. *Swertia corymbosa* (Griseb.) Fielding & Gardner.

Plate - 4



A. *Leucas lanceifolia* Desf., B. *Leucas suffruticosa* Benth., C. *Senecio multiceps* N.P. Balakr., D. *Neanotis indica* (DC.) W.H.Lewis, E. *Pedicularis zeylanica* Benth., F. *Crotalaria fysonii* Dunn.

Table 1: shows quantitative analysis of the Endemic species

| S.NO | FAMILY | NO.OF GENERA | NO.OF SPECIES |
|--------------|-----------------|--------------|---------------|
| 1. | Acanthaceae | 2 | 2 |
| 2. | Anacardiaceae | 1 | 1 |
| 3. | Apiaceae | 1 | 1 |
| 4. | Apocynaceae | 1 | 1 |
| 5. | Aquifoliaceae | 1 | 1 |
| 6. | Asteraceae | 4 | 9 |
| 7. | Balsaminaceae | 1 | 2 |
| 8. | Caprifoliaceae | 1 | 1 |
| 9. | Celastraceae | 2 | 2 |
| 10. | Droseraceae | 1 | 1 |
| 11. | Elaeocarpaceae | 1 | 1 |
| 12. | Eriocaulaceae | 1 | 1 |
| 13. | Fabaceae | 2 | 2 |
| 14. | Gentianaceae | 2 | 2 |
| 15. | Lamiaceae | 4 | 5 |
| 16. | Lauraceae | 1 | 1 |
| 17. | Melastomataceae | 1 | 1 |
| 18. | Myrtaceae | 1 | 2 |
| 19. | Orchidaceae | 1 | 1 |
| 20. | Orobanchaceae | 1 | 1 |
| 21. | Rosaceae | 1 | 1 |
| 22. | Rubiaceae | 5 | 7 |
| 23. | Symplocaceae | 1 | 1 |
| 24. | Urticaceae | 1 | 1 |
| Total | | 38 | 48 |

According to Balakrishnan and Mohanan, (1999), there are about 818 taxa of flowering plants endemic to Nilgiri Biosphere Reserve. The Western Ghats has much more endemic taxa (2116 species) than the rest of India. In the state-wise analysis, Tamil Nadu ranks first with 410 species, followed by Kerala (357), and Maharashtra (278), while Andaman and Nicobar Islands together contribute 278 taxa (Singh, *et al.*, 2015). With further references

from the Botanical Survey of India, Coimbatore, the collected endemic plants from the study area were 48 species. Most of these endemic species are restricted to small biogeographically areas and are rare in occurrence; their populations have been declining quickly due to habitat modifications and anthropogenic pressures. They are facing various degrees of threat of extinction.

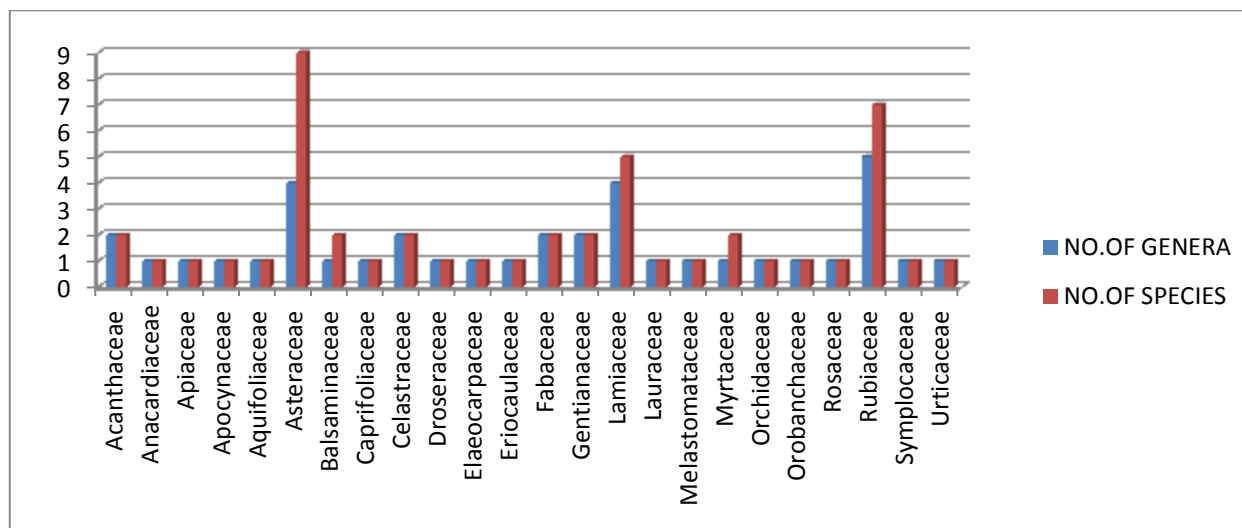


Figure 2: shows quantitative analysis of Rare, Endemic and threatened plants

Table 2: Check list of Rare, Endemic and threatened plants from Nilgiri forest of Southern Western Ghats

| S.No | Plant Name | Family | Habit | Habitat | Phenology | Status and Distribution | Field Number |
|------|--|-------------|-------------|-----------------------------------|----------------------|-----------------------------|---------------|
| 1. | <i>Anaphalis elliptica</i> (DC.) DC. | Asteraceae | Herb | Grasslands | July - March | Endemic to SWG | SMPRGH - 9705 |
| 2. | <i>Anaphalis leptophylla</i> (DC.) DC. | Asteraceae | Herb | Grasslands, in damp marshy places | June-October | Southern Western Ghats | SMPRGH - 9988 |
| 3. | <i>Anaphalis marcescens</i> (Wight.) C.B. Clarke | Asteraceae | Herb | Bank of streams on wet rocks | July - January | South India and Sri Lanka | SMPRGH - 9670 |
| 4. | <i>Anaphalis neelgerryana</i> (DC.) DC. | Asteraceae | Herb | Grasslands | July - October | Endemic to SWG | SMPRGH - 9685 |
| 5. | <i>Andrographis lawsonii</i> Gamble | Acanthaceae | Under shrub | Grasslands | September - December | Endemic to SWG | SMPRGH - 9688 |
| 6. | <i>Crotalaria fysonii</i> Dunn | Fabaceae | Herb | Grasslands | September - November | Endemic to Peninsular India | SMPRGH - 9707 |
| 7. | <i>Drosera peltata</i> Thunb. | Droseraceae | Herb | Grasslands | December - | Western Ghats | SMPRGH - |

| | | | | | | | |
|-----|--|----------------|----------------|---------------------------------------|-------------------------------|--|-------------------|
| | | | | | March | and Eastern Ghats | 9667 |
| 8. | <i>Elaeocarpus recurvatus</i> Corner | Elaeocarpaceae | Tree | Shola forests | February May | - Endemic to SWG | SMPRGH - 9521 |
| 9. | <i>Elatostema sessile</i> J.R. Forst & G.Forst. | Urticaceae | Herb | Evergreen forest | October November | - Endemic to SWG | SMPRGH - 9701 |
| 10. | <i>Eriocaulon collinum</i> Hook.f. | Eriocaulaceae | Herb | Marshy grasslands | November January | - Endemic to SWG | SMPRGH - 9675 |
| 11. | <i>Gentiana quadrifaria</i> Blume | Gentianaceae | Herb | Grasslands | September November | - India, Sri Lanka | SMPRGH - 9540 |
| 12. | <i>Hedyotis articularis</i> R.Br. ex Wight & Arn. | Rubiaceae | Under shrub | Shola forest | October December | - Endemic to SWG | SMPRGH - 9697 |
| 13. | <i>Hedyotis stylosa</i> R.Br. ex Wight & Arn. | Rubiaceae | Shrub | Evergreen Shola forest | November March | - Endemic to SWG | SMPRGH - 9702 |
| 14. | <i>Heracleum sprengelianum</i> Wight & Arn. | Apiaceae | Undershrub | Grasslands and shola margins | September- November | Peninsular India | SMPRGH - 10000 |
| 15. | <i>Ilex denticulata</i> Wall. ex Wight | Aquifoliaceae | Tree | Evergreen forest | January February | - Peninsular India, Sri Lanka | SMPRGH - 9533 |
| 16. | <i>Impatiens clavicornu</i> Turcz. | Balsaminaceae | Herb | Rock crevices in grasslands | June - October | Endemic to SWG | SMPRGH - 9692 |
| 17. | <i>Impatiens leschenaultii</i> (DC.) Wall. | Balsaminaceae | Herb | Shola forests and Grasslands | April December | - Endemic to SWG | SMPRGH - 9664 |
| 18. | <i>Pogostemon wightii</i> Benth. | Lamiaceae | Herb | Shola forest | December January | - Endemic to SWG | SMPRGH - 9703 |
| 19. | <i>Lasianthus acuminatus</i> Wight | Rubiaceae | Shrub | Evergreen and shola forests | May- November | Western Ghats | SMPRGH - 9167 |
| 20. | <i>Leucas lanceifolia</i> Desf. | Lamiaceae | Shrub | Margins of shola forest | January - June | Endemic to WG | SMPRGH - 9681 |
| 21. | <i>Leucas suffruticosa</i> Benth. | Lamiaceae | Under shrub | Grasslands | June - October | Endemic to peninsular India | SMPRGH - 9691 |
| 22. | <i>Liparis atropurpurea</i> Lindl. | Orchidaceae | Herb | In rock crevices in grasslands and | July-October | Southern Western Ghats | SMPRGH - 9666 |

| | | | | | | | |
|-----|--|-----------------|-------------|--|----------------------|------------------------------------|----------------|
| | | | | Evergreen forests | | | |
| 23. | <i>Microtropis ramiflora</i> Wight | Celastraceae | Tree | Shola forests | March - June | Endemic to peninsular India | SMPRGH - 9663 |
| 24. | <i>Moonia heterophylla</i> Arn. | Asteraceae | Under shrub | Shola forests and Grasslands | February - September | Endemic to peninsular India | SMPRGH - 9679 |
| 25. | <i>Neanotis decipiens</i> (Hook.f.) W.H. Lewis. | Rubiaceae | Herb | Evergreen Forest | October - November | Endemic to WG | SMPRGH - 9700 |
| 26. | <i>Neanotis indica</i> (DC.) W.H.Lewis | Rubiaceae | Shrub | Evergreen and shola forests | November-December | Western Ghats | SMPRGH - 9669 |
| 27. | <i>Neonotonia wightii</i> (Wight & Arn.) J.A. Lackey | Fabaceae | Shrub | Wet Places | September - November | Western Ghats and Eastern Ghats | SMPRGH - 9710 |
| 28. | <i>Nothopegia castaneifolia</i> (Roth) Ding Hou | Anacardiaceae | Tree | Moist deciduous and Evergreen forests | April-June | India | SMPRGH - 10236 |
| 29. | <i>Osbeckia muralis</i> Naudin | Melastomataceae | Shrub | Rocky area and moist deciduous forests | September - December | Endemic to WG | SMPRGH - 9693 |
| 30. | <i>Parnassia mysorensis</i> B. Heyne ex Wight & Arn. | Celastraceae | Shrub | Moist area and Grasslands | September - December | Endemic to peninsular India | SMPRGH - 9694 |
| 31. | <i>Pedicularis zeylanica</i> Benth. | Orobanchaceae | Shrub | Grasslands | September - December | Endemic to peninsular India | SMPRGH - 9690 |
| 32. | <i>Phoebe wightii</i> Meisn. | Lauraceae | Tree | Evergreen and shola forests | February-May | Peninsular India | SMPRGH - 10242 |
| 33. | <i>Plectranthus wightii</i> Benth. | Lamiaceae | Shrub | Grasslands | September - December | Endemic to peninsular India | SMPRGH - 9708 |
| 34. | <i>Pogostemon speciosus</i> Benth. | Lamiaceae | Shrub | Evergreen forests | November-January | Western Ghats | SMPRGH - 10430 |
| 35. | <i>Potentilla sundaica</i> (Blume) W.Theob. | Rosaceae | Shrub | Valley areas | March - July | India | SMPRGH - 9698 |
| 36. | <i>Psychotria nilgiriensis</i> Deb & M.G. Gangop. | Rubiaceae | Shrub | Semi evergreen forests | September - December | Endemic to SWG | SMPRGH - 9537 |
| 37. | <i>Saprosma foetens</i> (Wight) K. Schum. | Rubiaceae | Shrub | Evergreen and shola forest | Throughout the year | Endemic to SWG | SMPRGH - 9532 |

| | | | | | | | |
|-----|---|----------------|---------|--|---------------------|------------------------------------|---------------|
| 38. | <i>Senecio lavandulifolius</i> Wall. ex DC. | Asteraceae | Herb | Grasslands | February - June | Endemic to SWG | SMPRGH - 9539 |
| 39. | <i>Senecio multiceps</i> N.P. Balakr. | Asteraceae | Herb | Grasslands | August-October | Southern Western Ghats | SMPRGH - 9610 |
| 40. | <i>Senecio scandens</i> Buch. - Ham. ex D.Don | Asteraceae | Climber | Evergreen forest | December - April | India | SMPRGH - 9686 |
| 41. | <i>Strobilanthes wightiana</i> Nees | Acanthaceae | Shrub | Evergreen and semi - evergreen Forest | November - March | Endemic to SWG | SMPRGH - 9684 |
| 42. | <i>Swertia corymbosa</i> (Griseb.) Fielding & Gardner | Gentianaceae | Herb | Grasslands | October - December | Endemic to peninsular India | SMPRGH - 9689 |
| 43. | <i>Symplocos microphylla</i> Wight | Symplocaceae | Tree | Evergreen forest | February - April | Endemic to SWG | SMPRGH - 9531 |
| 44. | <i>Syzygium calophyllifolium</i> (Wight) Walp. | Myrtaceae | Tree | Evergreen forest | February - May | Endemic to WG and Sri Lanka | SMPRGH - 9695 |
| 45. | <i>Syzygium densiflorum</i> Wall. ex Wight & Arn. | Myrtaceae | Tree | Evergreen shola forest | April - June | Endemic to SWG | SMPRGH - 9538 |
| 46. | <i>Tylophora multiflora</i> (Wight & Arn.) Alston | Apocynaceae | Climber | Evergreen forest | August - May | Endemic to SWG | SMPRGH - 9662 |
| 47. | <i>Viburnum hebanthum</i> Wt. & Arn. | Caprifoliaceae | Tree | Evergreen forest | January - August | Endemic to SWG | SMPRGH - 9529 |
| 48. | <i>Youngia nilgiriensis</i> Babc. | Asteraceae | Herb | Shola forest | November - December | Endemic to SWG | SMPRGH - 9680 |

Conclusion

The Nilgiri is one of the most diverse floristic areas of Western Ghats with a mixture of both exotic and native species. The present study was documented many endemic and exotic plants from Mukurthi National Park, Western catchment a part of The Nilgiri Biosphere of Western Ghats, Nilgiri District, Tamil Nadu. Conservation and preservation of floral diversity is an important social, moral and economic issue where documentation of plants is the basic step in such program. Some of the threatened factors such as over-exploitation of natural resources and other anthropogenic activities adversely affect the existing ecosystem and it may lead to the rarity of many species in future. The rapid exploitation and conservation of forests in Nilgiris, for raising horticultural and agricultural crops, creation of hydroelectric project have affected virgin forest cover. As a result, many of the valuable and rare, endemic plant species which were once abundant are now facing extinction. Conservation and preservation of plant diversity is an important social economic and moral issue and has deep inter - connections with all bio resources. A thorough taxonomic study of the flora is essential to understand and access the richness of their bio-diversities. There is an urgent need for developing pragmatic conservation strategies for endemic plants in the southern Western Ghats, which may lead to their effective protection.

Acknowledgments

The authors are grateful to The Director General, Central Council Research in Homoeopathy (CCRH), New Delhi, for the encouragement and providing necessary facilities for carrying out the work and authors also thankful to Dr. V. Ravichandran, Senior Preservation Assistant, Botanical Survey of India, Southern Circle, Coimbatore, Tamil Nadu for valuable comments.

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Source of support: Nil;

Conflict of interest: The authors declare no conflict of interests.

Cite this article as:

Mugendhiran, S., J. Shashikanth., Digvijay, V. and B. Karthik. "Documentation of Rare, Endemic and Threatened plants from Nilgiri forest of Southern Western Ghats, Tamil Nadu." *Annals of Plant Sciences*.12.09 (2023): pp. 5955-5969.