

# Monocotyledonous plant diversity in and around Centre of Medicinal Plants Research in Homoeopathy (CMPRH) Campus, Emerald, Nilgiri District, Tamil Nadu, India

J. Shashikanth<sup>1\*</sup>, S. Mugendhiran<sup>2</sup> and A. Vanitha<sup>3</sup>

<sup>1,2,3</sup>Centre of Medicinal Plants Research in Homoeopathy, 3/126, Indira Nagar, Emerald–643209, Nilgiri District, India. E-mail: <sup>1\*</sup>jaleshashikanth2000@gmail.com, <sup>2</sup>mugendhiranselvamm@gmail.com, <sup>3</sup>ajjanvanitha@gmail.com

\*Corresponding author

Manuscript received: 14 February 2022

Accepted for publication: 25 May 2022

## ABSTRACT

Shashikanth J., Mugendhiran S. & Vanitha A. 2022. Monocotyledonous plant diversity in and around Centre of Medicinal Plants Research in Homoeopathy (CMPRH) Campus, Emerald, Nilgiri District, Tamil Nadu, India. *Geophytology* 51(1&2): 149–154.

The present study was conducted to collect, identify and document monocotyledonous flora in and around Centre of Medicinal Plants Research in Homoeopathy (CMPRH), Emerald, Nilgiri District, Tamil Nadu, India. The survey of monocotyledonous plants, carried out during 2018–2021, revealed presence of 74 species belonging to 57 genera and 18 families. Family *Poaceae* comprises maximum number of species (29 spp.), followed by *Liliaceae* (8 spp.). Dominant genera are *Allium*, *Curcuma*, *Eragrostis*, *Cymbopogon* and *Iris* (3 spp. each) followed by *Aloe*, *Asparagus*, *Bryophyllum*, *Cyanotis*, *Digitaria* and *Kyllinga* (2 spp. each). Most of the species are found in terrestrial ecosystem.

**Keywords:** Monocotyledons, *Poaceae*, Habitat destruction, CMPRH, Nilgiri District, Tamil Nadu, India.

## INTRODUCTION

Monocotyledons constitute a fascinating plant group. They have single cotyledon in embryo, leaves with parallel venation, stems having irregularly scattered woody fibres, usually trimerous flowers and various kinds of underground stems. The leaves are usually long and with sheathing bases. The grass habit is the characteristic of the families *Cyperaceae*, *Poaceae* and *Juncaceae*. It is marked with the slender tufted leaves arising from slender aerial stems and rhizomes (Bandyopadhyay & Mukherjee 2016). This group is economically important for being a major source of medicines, ornamentals, edibles, fibres, fodder and

building materials. The Western Ghats region of India has interesting geographic and climatic conditions mostly with shola forests and vegetation supporting a large variety of flora, thus the region is also rich in monocotyledonous plants. Therefore, an inventory of monocotyledonous plants of the area is essential not only from taxonomic point of view but also from ecological, soil erosion and resource management viewpoint. Except for few publications (Fyson 1915–1920, Gamble 1915–1919, 1921–1925, Fischer 1928–1935), there is no comprehensive previous work on the floristic composition of this area. However, there are studies based on limited aspects by Bailey (1949),

Krishnamoorthy (1953), Gupta (1962), Mathew (1983) and Nair and Henry (1983).

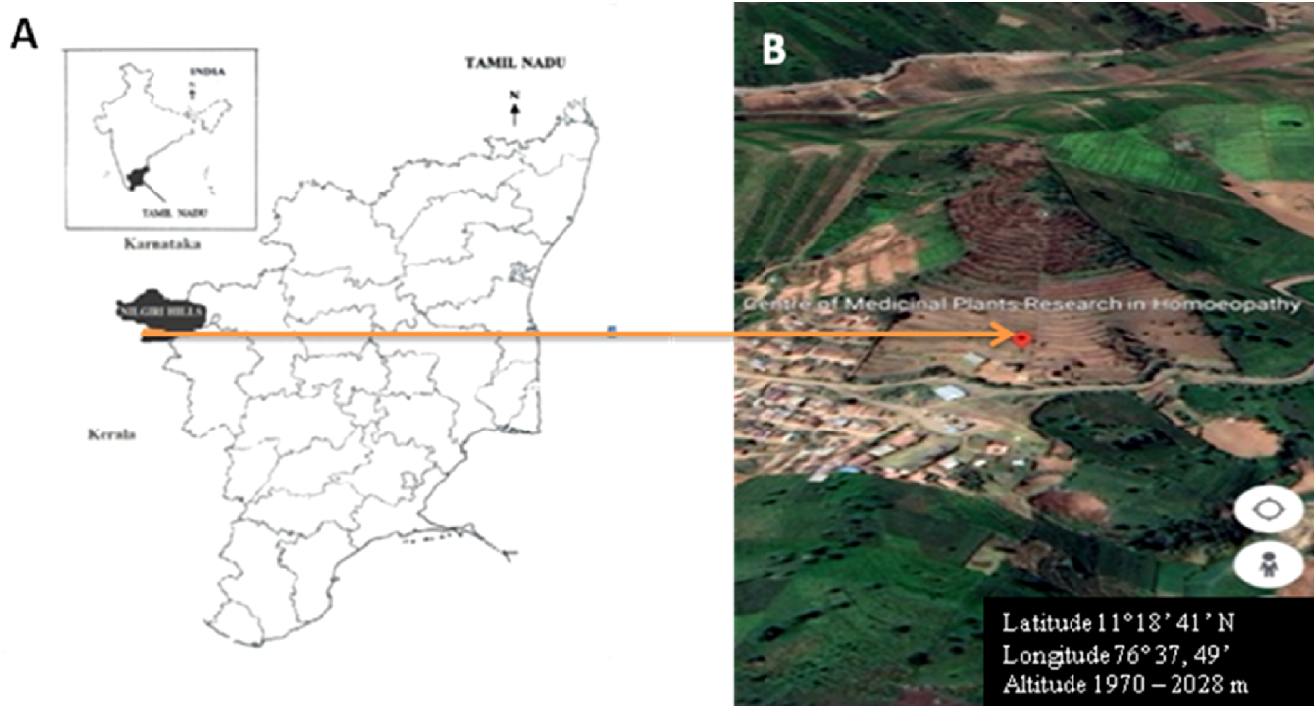
### MATERIAL AND METHODS

**Study Site:** CMPRH Campus in the Emerald, Kundha Taluk is located between  $11^{\circ}18'$  and  $11^{\circ}41'$  north latitudes and  $76^{\circ}37'$  and  $76^{\circ}49'$  east longitudes. This land site is situated in the south-west side of Udthagamandalam and nearly west side of Avalanche Reserve Forest and Emerald Reservoir. The reservoir outlet waterway flows to the nearby land site at a distance of 800 m with deep valley. The land site is present at an altitude from 1970 m (near office) to 2028m above sea level (at the top land). The total altitude difference is 58 m with more than 31 slopes. The predominant soil type found in this area is clay loam and in some patches black soil rich in humus. More than 1.5 m deep soil is yellowish soil with clay. The pH value of the soil ranges from 4 to 5. The top soil is very fertile and black with rich loam. The latitude and longitude have been measured with Global Position System (GPS) instrument (Figure 1).

**Survey and Collection:** The field Survey of monocotyledonous plants of CMPRH, Emerald, The Nilgiri District was carried out during different seasons from June 2018 to May 2021. Collected samples were processed and mounted on herbarium sheets following the methods of Jain and Rao (1977). Monocotyledonous plants, including grass weeds, growing there were also recorded and collected. The mounted specimens were identified with the help of regional and local floras (Bailey 1949, Fyson 1915–1920, Gamble & Fischer 1915–1935, Sharma et al. 1977) and matching with authentic herbarium specimens and with opinion of experts at Botanical Survey of India, Southern Circle, Coimbatore. The identified specimens were deposited at CMPRH Herbarium.

### RESULT AND DISCUSSION

In the present study, a total number of 74 monocotyledonous taxa, belonging to 57 genera and 18 families, have been recorded (Table 1). Maximum number of species belong to the *Poaceae* (29 spp.), followed by *Liliaceae* (8 spp.), *Cyperaceae* (5 spp.),



**Figure 1.** Map showing location of Centre of Medicinal Plants Research in Homoeopathy (CMPRH) Campus (study area), Emerald, Nilgiri District, Tamil Nadu, India. **A.** Map of Tamil Nadu showing location of Nilgiri District. **B.** CMPRH.

**Table 1.** Diversity in monocotyledons of Centre of Medicinal Plants Research in Homoeopathy (CMPRH) Campus and its surrounding areas.

Sl. no.	Botanical Name	Family	Habit and Habitat	Economic Importance
1.	<i>Acorus calamus</i> L.	<i>Acoraceae</i>	Herb, Terrestrial	Medicinal
2.	<i>Agapanthus africanus</i> (L.) Hoffmanns.	<i>Amaryllidaceae</i>	Shrub, Terrestrial	Ornamental
3.	<i>Agave americana</i> L.	<i>Liliaceae</i>	Shrub, Terrestrial	Medicinal and Ornamental
4.	<i>Agropyron repens</i> (L.) P. Beauv.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Medicinal
5.	<i>Allium ascalonicum</i> L.	<i>Liliaceae</i>	Herb, Terrestrial	Medicinal and Edible
6.	<i>Allium cepa</i> L.	<i>Liliaceae</i>	Herb, Terrestrial	Medicinal and Edible
7.	<i>Allium sativum</i> L.	<i>Liliaceae</i>	Herb, Terrestrial	Medicinal and Edible
8.	<i>Aloe arborescens</i> Mill.	<i>Liliaceae</i>	Shrub, Terrestrial	Ornamental and Medicinal
9.	<i>Aloe vera</i> (L.) Burm. f.	<i>Liliaceae</i>	Herb, Terrestrial	Medicinal
10.	<i>Ananas comosus</i> (L.) Merr.	<i>Bromeliaceae</i>	Herb, Terrestrial	Medicinal and Edible
11.	<i>Anthericum ramosum</i> L.	<i>Asparagaceae</i>	Herb, Terrestrial	Ornamental
12.	<i>Apluda mutica</i> L.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed
13.	<i>Asparagus officinalis</i> L.	<i>Liliaceae</i>	Herb, Terrestrial	Medicinal and Edible
14.	<i>Asparagus racemosus</i> Willd.	<i>Liliaceae</i>	Climber, Terrestrial	Medicinal and Edible
15.	<i>Avena sativa</i> L.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Medicinal and Edible
16.	<i>Brachypodium sylvaticum</i> (Huds.) P. Beauv.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed
17.	<i>Briza maxima</i> L.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed
18.	<i>Bromus catharticus</i> Vahl	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed
19.	<i>Bryophyllum pinnatum</i> (Lam.) Oken	<i>Crassulaceae</i>	Herb, Terrestrial	Medicinal and Ornamental
20.	<i>Bryophyllum serratum</i> (Mannoni & Boiteau) Blanco	<i>Crassulaceae</i>	Herb, Terrestrial	Ornamental
21.	<i>Canna indica</i> L.	<i>Cannaceae</i>	Shrub, Terrestrial	Medicinal and Ornamental
22.	<i>Carex baccans</i> Nees	<i>Cyperaceae</i>	Herb, Terrestrial	Weed
23.	<i>Carex brunnea</i> Thunb.	<i>Cyperaceae</i>	Herb, Terrestrial	Weed
24.	<i>Chamaecostus cuspidatus</i> (Nees & Mart.) C.D. Specht & D.W. Stev.	<i>Costaceae</i>	Shrub, Terrestrial	Medicinal and Edible
25.	<i>Commelina benghalensis</i> L.	<i>Commelinaceae</i>	Herb, Terrestrial	Weed
26.	<i>Costus speciosus</i> (J. Konig) Sm.	<i>Costaceae</i>	Shrub, Terrestrial	Medicinal
27.	<i>Crinum latifolium</i> L.	<i>Amaryllidaceae</i>	Herb, Terrestrial	Medicinal and Ornamental
28.	<i>Crocoshmia crocosmiiflora</i> (Lemoine) N.E. Br.	<i>Iridaceae</i>	Herb, Terrestrial	Ornamental and Garden escaped
29.	<i>Curcuma amada</i> Roxb.	<i>Zingiberaceae</i>	Herb, Terrestrial	Medicinal
30.	<i>Curcuma ceasia</i> Roxb.	<i>Zingiberaceae</i>	Herb, Terrestrial	Medicinal
31.	<i>Curcuma longa</i> L.	<i>Zingiberaceae</i>	Herb, Terrestrial	Medicinal and Edible
32.	<i>Cyanotis cristata</i> (L.) D. Don	<i>Commelinaceae</i>	Herb, Terrestrial	Weed
33.	<i>Cyanotis pilosa</i> Schult. & Schult. f.	<i>Commelinaceae</i>	Herb, Terrestrial	Weed
34.	<i>Cymbopogon nardus</i> (L.) Rendle	<i>Poaceae</i>	Herb (Grass), Terrestrial	Medicinal
35.	<i>Cymbopogon winterianus</i> Jowitt ex Bor	<i>Poaceae</i>	Herb (Grass), Terrestrial	Medicinal
36.	<i>Cymbopogon</i> spp. (L.)	<i>Poaceae</i>	Herb (Grass), Terrestrial	Medicinal
37.	<i>Cynodon dactylon</i> (L.) Pers.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Medicinal
38.	<i>Cyperus rotundus</i> L.	<i>Cyperaceae</i>	Herb (Grass), Terrestrial	Medicinal
39.	<i>Dactyloctenium aegyptium</i> (L.) Willd.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed
40.	<i>Dianella tasmanica</i> Hook. f.	<i>Xanthorrhoeaceae</i>	Herb (Grass), Terrestrial	Ornamental
41.	<i>Dieffenbackia seguine</i> (Jacq.) Schott	<i>Araceae</i>	Shrub, Terrestrial	Medicinal and Ornamental
42.	<i>Digitaria violascens</i> Link	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed
43.	<i>Digitaria wallichiana</i> (Wt. & Arn. Ex Staud.) Stapf	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed
44.	<i>Elettaria cardamomum</i> (L.) Maton	<i>Zingiberaceae</i>	Shrub, Terrestrial	Medicinal and Edible
45.	<i>Eleusine indica</i> (L.) Gaertn.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed
46.	<i>Eragrostis curvula</i> (Schard.) Nees	<i>Poaceae</i>	Herb, Terrestrial	Weed
47.	<i>Eragrostis cilianensis</i> (All.) Janch.	<i>Poaceae</i>	Herb (Grass), Terrestrial	Weed

48.	<i>Eragrostis patula</i> (Kunth) Steud.	Poaceae	Herb (Grass), Terrestrial	Weed
49.	<i>Eria nana</i> A. Rich.	Orchidaceae	Herb, Terrestrial	Ornamental
50.	<i>Iris florentina</i> L.	Iridaceae	Herb, Terrestrial	Medicinal and Ornamental
51.	<i>Iris germanica</i> L.	Iridaceae	Herb, Terrestrial	Medicinal and Ornamental
52.	<i>Iris japonica</i> Thunb.	Iridaceae	Herb, Terrestrial	Medicinal, Ornamental and Garden escaped
53.	<i>Isachne kunthiana</i> (Wight & Arn. ex Steud.) Miq.	Poaceae	Herb (Grass), Terrestrial	Weed
54.	<i>Kalanchoe grandiflora</i> Wight & Arn.	Crassulaceae	Herb, Terrestrial	Ornamental
55.	<i>Kyllinga odorata</i> Vahl	Cyperaceae	Herb (Grass), Terrestrial	Weed
56.	<i>Kyllinga triceps</i> Rottb.	Cyperaceae	Herb (Grass), Terrestrial	Weed
57.	<i>Lolium temulentum</i> L.	Poaceae	Herb (Grass), Terrestrial	Medicinal
58.	<i>Melinis repens</i> (Willd.) Zizka	Poaceae	Herb (Grass), Terrestrial	Weed
59.	<i>Musa paradisiaca</i> L.	Musaceae	Pseudo tree, Terrestrial	Medicinal and Edible
60.	<i>Oplismenus burmannii</i> (Retz.) P. Beauv.	Poaceae	Herb (Grass), Terrestrial	Weed
61.	<i>Pennisetum clandestinum</i> Hochst. Ex Chiov.	Poaceae	Herb (Grass), Terrestrial	Weed
62.	<i>Poa annua</i> L.	Poaceae	Herb (Grass), Terrestrial	Weed
63.	<i>Saccharum officinarum</i> L.	Poaceae	Shrub, Terrestrial	Medicinal and Edible
64.	<i>Sansevieria roxburghiana</i> Schult. & Schult. f.	Asparagaceae	Herb, Terrestrial	Medicinal and Ornamental
65.	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	Poaceae	Herb (Grass), Terrestrial	Weed
66.	<i>Smilax aspera</i> L.	Smilacaceae	Climber, Terrestrial	Medicinal
67.	<i>Sporobolus indicus</i> (L.) R. Br.	Poaceae	Herb (Grass), Terrestrial	Weed
68.	<i>Themeda triandra</i> Forssk.	Poaceae	Herb (Grass), Terrestrial	Weed
69.	<i>Triticum aestivum</i> L.	Poaceae	Herb (Grass), Terrestrial	Medicinal and Edible
70.	<i>Vanilla planifolia</i> Jacks. ex Andrews	Orchidaceae	Climber, Terrestrial	Medicinal
71.	<i>Vetiveria zizanioides</i> (L.) Nash	Poaceae	Herb (Grass), Terrestrial	Medicinal
72.	<i>Yucca filamentosa</i> L.	Asparagaceae	Shrub, Terrestrial	Medicinal
73.	<i>Zantedeschia aethiopica</i> (L.) Spreng.	Araceae	Herb, Semi-aquatic	Medicinal
74.	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Shrub, Terrestrial	Medicinal and Edible

*Zingiberaceae* (5 spp.) and *Iridaceae* (4 spp.) (Table 2, Figure 2). *Poaceae* and *Cyperaceae* families comprise significant floristic components in the study area. Six families are represented by only single species, e.g. *Acoraceae*, *Bromeliaceae*, *Cannaceae*, *Musaceae*, *Smilacaceae* and *Xanthorrhoeaceae* (Table 2). Most of the species are found in terrestrial ecosystems rather than the aquatic habitat.

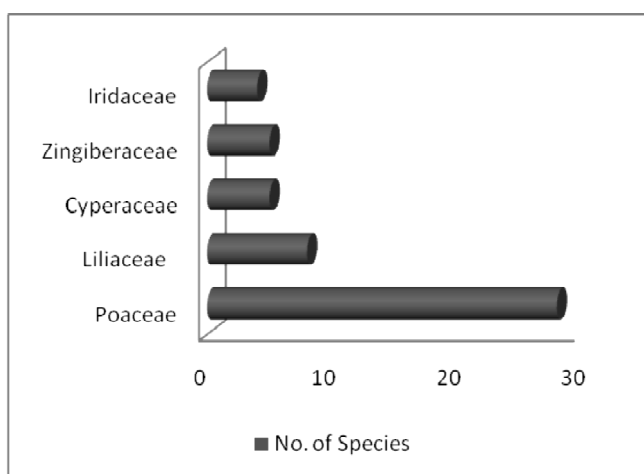
The area supports a luxuriant growth of robust and tall grass like *Carex baccans* and *Cynodon dactylon*. A number of monocotyledons were found on bounds, road sides and in agricultural fields. Some such species are *Apluda mutica*, *Brachypodium sylvaticum*, *Bromus catharticus*, *Briza maxima*, *Commelina benghalensis*, *Cynodon dactylon*, *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Eragrostis curvula*, *Eragrostic cilianensis*, *Isachne kunthiana*, *Melinis repens*, *Setaria pumila* and *Themeda triandra*. Habit of plants in the area are as follows: trees (1%), shrubs (15%), herbs (80%) and climbers

(4%). It was noticed during the study that a number of exotic weeds and garden escaped plants established themselves as permanent denizens of CMPRH monocotyledonous flora. The common among them are *Agapanthus africanus*, *Canna indica*, *Crocospia crocosmiiflora*, *Iris japonica* and *Kalanchoe grandiflora*. This group deserves special attention from the economic point of view as the major source of medicines (41%), ornamentals (15%), edibles (16%) and miscellaneous (28%), e.g. grasses, weeds and garden escaped plants (Figure 3).

Human beings are the major cause of biodiversity loss, in the present area, due to habitat destruction caused by deforestation, overpopulation, pollution and global warming. Species which are physically large and those living in forests are more affected by habitat destruction. It is therefore evident that biodiversity, which is crucial for life on earth, is coming under threat because of variety of factors related to human activities.

### Utilization of monocotyledonous flora:

Monocotyledonous plants play an important role in man's economic activity as they have a great economic potential. Some of them are highly ornamental. Grain grasses are most important for being the major source of human nutrition and also of animal food, e.g. rice, wheat, oats, rye, barely, maize, *Sorghum* and sugarcane. Grasses are good soil binders and moisture conservers. Some of the medicinal plants yield essential oils. Grasses constitute major ground cover and make significant contribution to biomass production. They play crucial role in the maintenance of global ecosystem and biodiversity (Khude 2016). Among the documented monocotyledonous flora, medicinal plants occupy a major portion, viz. *Acorus calamus*, *Asparagus officinalis*, *Agropyron repens*, *Aloe vera*, *Bryophyllum pinnatum*, *Vetiveria zizanioides*, *Agave americana*, *Yucca filamentosa*, *Iris florentina*, *Iris germanica*, *Iris japonica*, *Smilax aspera*, *Ananas comosus*, *Costus igneus* (syn: *Chamaecostus cuspidatus*), *Musa paradisiaca*, *Allium sativum*, *Allium cepa*, *Avena sativa*, *Triticum aestivum*, *Cymbopogon nardus*, *Lolium temulentum*, *Cynodon dactylon* etc., followed by ornamentals, viz. *Aloe arborescence*, *Crococsmia crocosmiiflora*, *Bryophyllum serratum*, *Kalanchoe grandiflora*, *Eriana*, *Dianella tasmanica* etc. Few plants are useful in controlling soil erosion like *Vetiveria zizanioides*,



**Figure 2.** Dominant monocotyledonous families in Centre of Medicinal Plants Research in Homoeopathy (CMPRH) Campus, Emerald, Nilgiri District, Tamil Nadu, India

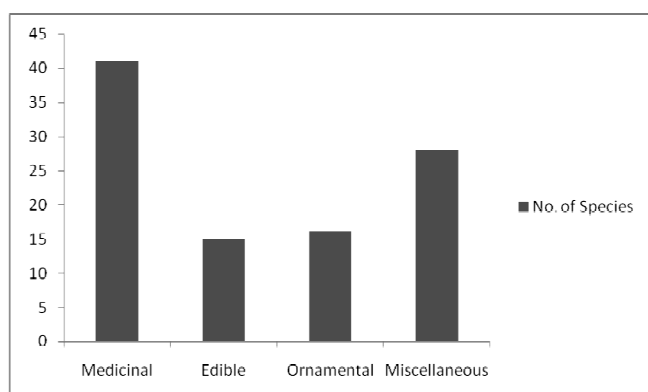
**Table 2.** Number of genera and species in each monocotyledonous family found in Centre of Medicinal Plants Research in Homoeopathy (CMPRH) Campus and its surrounding areas.

Sl. no.	Families	Number of Genera	Number of Species
1.	<i>Acoraceae</i>	1	1
2.	<i>Amaryllidaceae</i>	2	2
3.	<i>Araceae</i>	2	2
4.	<i>Asparagaceae</i>	3	3
5.	<i>Bromeliaceae</i>	1	1
6.	<i>Cannaceae</i>	1	1
7.	<i>Crassulaceae</i>	2	3
8.	<i>Commelinaceae</i>	2	3
9.	<i>Costaceae</i>	2	2
10.	<i>Cyperaceae</i>	2	3
11.	<i>Iridaceae</i>	3	6
12.	<i>Liliaceae</i>	4	8
13.	<i>Musaceae</i>	1	1
14.	<i>Orchidaceae</i>	2	2
15.	<i>Poaceae</i>	24	29
16.	<i>Smilacaceae</i>	1	1
17.	<i>Xanthorrhoeaceae</i>	1	1
18.	<i>Zingiberaceae</i>	3	5

*Cymbopogon* species and *Eragrostis curvula*. Very few plants are edible like *Saccharum officinarum*, *Allium ascalonicum*, *Allium cepa*, *Allium sativum*, *Asparagus officinalis*, *Asparagus racemosus*, *Avena sativa*, *Chamaecostus cuspidatus* and *Musa paradisiaca*.

### CONCLUSION

It is evident from the present study that CMPRH has a diverse monocotyledonous flora and it plays a vital role in controlling the soil erosion and vital source of medicinal plants, but over-exploitation and unscientific collection of some species such as *Acorus calamus*, *Asparagus racemosus*, *Chamaecostus cuspidatus* and *Curcuma* caused serious damage to the population of these species. Biotic interference like grazing in forest, urbanization, etc., have led to loss of habitat as well as species diversity. Therefore, there is need to protect and conserve over-exploited species and other monocotyledonous species for ecological perspective of CMPRH. Though the area is rich in monocotyledonous diversity, still the area diversity is in grave danger. In the present era, human beings are the most dangerous cause of destruction of the plant



**Figure 3.** Uses of monocotyledonous families in Centre of Medicinal Plants Research in Homoeopathy (CMPRH) Campus, Emerald, Nilgiri District, Tamil Nadu, India.

diversity. Habitat destruction is a major cause for biodiversity loss. Habitat loss is caused by deforestation, overpopulation, pollution and global warming. We can see that diversity which is crucial for the wellbeing of life on earth is coming under threats of many factors related to human activities and therefore there is urgent need to take actions to protect the magnificent plant diversity in order to maintain the earth biodiversity.

#### ACKNOWLEDGEMENTS

The authors are thankful to Dr. Anil Khurana, Director General, Central Council for Research in Homoeopathy, New Delhi for providing necessary facilities and encouragement.

#### REFERENCES

- Bailey L.H. 1949. Manual of cultivated plants: Most commonly grown in the continental United States and Canada. The Macmillan Company, New York.
- Bandyopadhyay S. & Mukherjee S.K. 2016. A sketch of monocot flora of Koch Bihar District, West Bengal, India. *Journal of Economic and Taxonomic Botany* 40(3-4): 99-103.
- Fyson P.F. 1915-1920. The flora of the South Indian hill stations. Superintendent, Govt. Press, Madras: 78-93.
- Gamble J.S. 1915-1919. Flora of the Presidency of Madras (*Ranunculaceae* to *Caprifoliaceae*), Adlord and Sons Ltd. London, Vol. I
- Gamble J.S. 1921-1925. Flora of the Presidency of Madras (*Rubiaceae* to *Euphorbiaceae*), Adlord and Sons Ltd. London, Vol II.
- Fischer C.E.C. 1928-1935. Flora of the Presidency of Madras (*Ulmaceae* to *Graminae*), Adlord and Sons Ltd. London, Vol III.
- Gupta R.K. 1962. Some observations on the plants of the South Indian Hill tops (Nilgiri & Palni) and their distribution in the Himalayas. *Journal of Indian Botanical Society* 41: 1-15.
- Jain S.K & Rao R.R. 1977. A Handbook of field and herbarium methods. Today and Tomorrow's Printers and Publishers.
- Khude V.S.. 2016. Diversity studies of grasses around Arjunnagar. *Plant Archives* 16(1): 477-478.
- Krishnamoorthy S. 1953. Horticultural and economics plants of the Nilgiris. Coimbatore.
- Mathew K.M. 1983. The flora of the Tamil Nadu, Carnatic. Vol. III, The Rapinat Herbarium, St. Joseph's College, Tiruchirapalli.
- Nair N.C. & Henry A.N. 1983. Flora of Tamil Nadu, Series 1: Analysis Vol. I. Botanical Survey of India, Howrah. *Nature* 446: 1079-1081.
- Sharma B.D., Shetty B.V., Vajravelu E., Kumari G.R., Vivekanathan K., Chandrabose M., Swaminathan M.S., Chandrasekaran R., Subbarao G.V., Ellis J.L., Rathakrishnan N.C., Karthikeyan S., Chandrasekaran V. & Srinivasan S.R. 1977. Studies on the flora of Nilgiris, Tamil Nadu. *Biological Memoirs* 2 (1&2): 1-186.