Indian Forester, **143** (12) : 1236-1240, 2017
http://www.indianforester.co.in

ISSN No. 0019-4816 (Print)
ISSN No. 2321-094X (Online)

COMPARATIVE ANALYSIS OF PLANT DIVERSITY WITH REFERENCE TO CHAMUNDI HILLS IN MYSORE DISTRICT OF KARNATAKA STATE, INDIA

M.M. SWAMY, A.L. VEERABHADRA SWAMY AND R.P. ANURADHA[1]

Department of Botany, J.S.S. College for Women, Saraswathipuram, Mysore (Karnataka)
E-mail: veerual@gmail.com

ABSTRACT

The forest cover in Chamundi hills ranges from dry scrub vegetation to dry deciduous forest type. The study was undertaken by foot survey method. There are 483 species of flowering plants, spread under 94 families. Among these, 423 species of plants belong to dicotyledonous group and 60 species of plants come under monocotyledonous group. Asteraceae, Fabaceae, Euphorbiaceae, Rubiaceae and Poaceae families with high number of plant species. There are about 24 common shrubs and trees, 11 rare and important plants and 65 medicinally important plants were recorded during the field visit and few plant species were preserved in the herbarium.

***Key words*:** Diversity, Families, Forest, Mysore, Plant and Species

Introduction

Chamundi hills, an isolated rocky outcrop are a landmark of Mysore city. The study of plant diversity is one of the prime subjects from the time man became conscious about his environment and usefulness of plants and animals to the society. In view of all other parameters in the vein of altitude, slope, etc. were constant. It could merely be argued that deforestation has considerable influence on species occurrence, abundance and distribution in the Chamundi hills of Karnataka. Zones protected from human interventions have higher floral diversity, abundance and distribution compared to un-protected zone. A total extent of 613 ha. was declared as reserve forest by Maharaja of Mysore in 1929 and handed over to the forest department. Today the total extent is spread around 2013.5 ha. An estimation of biological diversity is a widely accepted new trend in life sciences. Exploring the biodiversity consists of surveying, sorting, cataloguing and quantifying resources which are an essential part for conservation. In this respect, Chamundi hills forest in Mysore district was evaluated for its plant diversity. In the present investigation, Chamundi hill was visited regularly during 2010 to 2012 for the analysis of plant diversity. Similar work has been carried out by Kulkarni and Nipunage (2009) recorded floristic diversity and ecological studies of Dhup-Rahat from Bhor region in Pune district. Shirkai sacred grove in Pune district was evaluated for their plant diversity (Kulkarni and Shindikar, 2005). An environmental impact of sacred groves on flora and fauna as well as conservation of water streams are reported from Western ghats (Kulkarni and Kumbhojkar, 1999; Kumbhojkar and Kulkarni, 1998). Chamundi hills which enable to become repositories of valuable germplasm of medicinal plants, endangered and endemic plant species. The hills create microclimate which permits regeneration and nourishment of biotic species. The need for such studies has been felt for quite some time. In this regard, the studies from Maharashtra in the form of floristic checklists are available. However, the vegetation composition and quantification is hardly ever mentioned in the literature of Kulkarni *et al.* (2013).

Topography of study area

Chamundi hills are estimated to be 800 million years old as per Rubidium-Stromium dating method by Crawford. Chamundi hills geologically come under the youngest formation of rocks in Karnataka. The hills are chiefly composed of granite, which is surrounded on all sides by the older peninsular gneisses. Soil thickness various from 0.5 to 1.5 m. Soil is gravel in nature due to the presence of quartz (Fig. 1 and 2).

Material and Methods

Field visit were carried out regularly from May 2010 to August 2012. It encompasses the spring, winter and summer seasons so that it enables us to study the plants with their flowers which bloom seasonally. Forty eight periodic visits were undertaken and detailed systematic list of plants has been prepared on the basis of field study. The study was undertaken by foot survey method. We have climbed the hills from different directions. The whole

Among 483 species of plants, 423 species belonging to dicotyledonous (78 families) and 60 species belonging to monocotyledonous (14 families) were identified in Chamundi hills.

[*1]Department of Biology, J.S.S. College for Women, Chamarajanagara, Karnataka

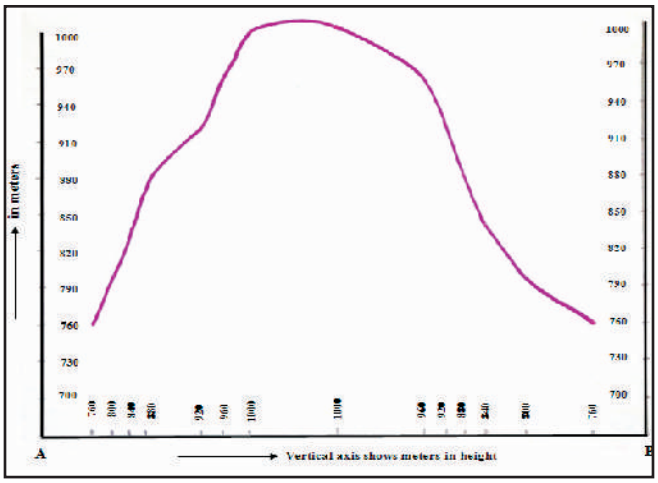

Fig. 1: Topography of study area.

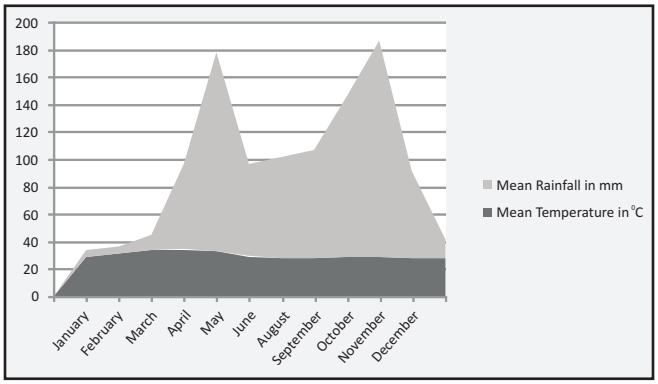

Fig. 2: Rainfall and temperature of study area.

study area was divided into two zones based on vegetation cover for convenient to study.

1. Z-I: Low Density Vegetation Zone (Along the road ways)
2. Z-II: Heavy Density Vegetation Zone (inside the forest) (Irshad and Khan, 2012)

Initially survey was undertaken along the road ways (Z-I), entered the forest horizontally from the roads (Z-II). Then from the foothills reach the top of the hills through the steps (Z-I). Where again entered the forest horizontally on either side of the steps (Z-II). In this way almost 70% of the thick forest is covered. The rest of the area was covered with the help of residents of locality at the foothills. With the help of secateurs we have collected the twigs of herbs, shrubs and climbers and even trees. Few specimens have been collected in the vasculum and brought them to the lab and prepared the herbarium. Collections of these plants were maintained in Department of Botany, J.S.S. College for Women, Mysore. However, rare plants were not collected in view of protecting them. Use floras, manuals, photographs and expertise knowledge for identification of collected plants during field visit and in the laboratory. Scalpel, forceps and lens system were used to dissect floral parts for identification. After identification of the plant species it is subjected to prepare the herbarium with providing accession number (Serial number).

Results

Following data is prepared based on our regular field survey and observation of both Z-I and Z-II. During the visits there are about 483 flowering plants, two macro fungi (*Agaricus campestris* L. and *Polyporous arcularius* (Batsch) Fr.), two bryophytes (*Funaria hygrometrica* Hedw. and *Riccia plana* Taylor.) and seven Pteridophytes such as *Actiniopteris radiata* (J. Koenig ex Sw.) Link, *Adiantum philippense* L., *Cheilanthis farinosa* (Forssk.) Kaulf., *Dryopteris concolor* (Langsd. & Fisch.) Kuhn., *Hemionitis arifolia* (Burm.) Moore., *Pteridium revolutum* (Blume) Nakai. and *Selaginella plana* (Desv. ex Poir.) Hieron. were indentified and listed (Fig. 3) from Z-I and Z-II respectively. Tables 1, 2, 3 and 4 show the names of species recorded from both zones. Among 483 species of plants 423 species belongs to dicotyledonous (78 families), 60 species belongs to monocotyledonous (14 families) were identified. In 78 families of dicotyledonous Asteraceae and Fabaceae families stand first with 30 plant species followed by Euphorbiaceae and Apocynaceae with 27 species each, Fabaceae (24 spp.), Rubiaceae (23 spp.), Acanthaceae (18 spp.), Verbenaceae (15 spp.), Convolvulaceae (14 spp.), Amaranthaceae and Lamiaceae (12 spp. in each family) and two families consists of 11 spp. in each. It includes Moraceae and Malvaceae (Fig. 4). In the remaining 64 families out of 78 dicotyledonous families consists of only less than 10 species in each family (Table 1).

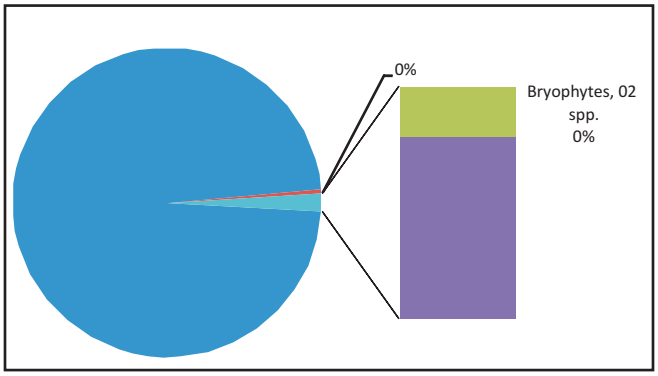

Fig. 3: Diagrammatic representation of distribution of plant diversity in Chamundi hills.

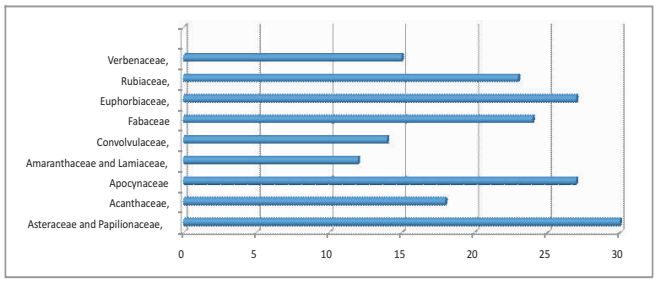

Fig. 4: Comparison of number of species in dicotyledonous families.

Table 1: List of dicotyledonous families have less than 10 species.

Sl. No.	Name of the family	No. of species	Sl. No.	Name of the family	No. of species	Sl. No.	Name of the family	No. of species
01	Aizoaceae	06	24	Gentianaceae	01	47	Polygalaceae	03
02	Anacardiaceae	06	25	Geraniaceae	01	48	Portulacaceae	03
03	Annonaceae	03	26	Boraginaceae	01	49	Potamogetonaceae	01
04	Apiaceae	02	27	Lentibulariaceae	01	50	Rhamnaceae	06
05	Araliaceae	01	28	Loganiaceae	01	51	Rutaceae	06
06	Aristolochiaceae	02	29	Loranthaceae	03	52	Salvadoraceae	01
07	Bignoninaceae	06	30	Lythraceae	05	53	Santalaceae	02
08	Boraginaceae	08	31	Magnoliaceae	01	54	Sapindaceae	02
09	Brassicaceae	01	32	Malvaceae	05	55	Sapotaceae	01
10	Burseraceae	02	33	Meliaceae	05	56	Scrophulariaceae	05
11	Cactaceae	01	34	Menispermaceae	04	57	Simaroubaceae	02
12	Capparidaceae	07	35	Myrtaceae	03	58	Solanaceae	08
13	Casurinaceae	01	36	Nyctaginaceae	04	59	Tiliaceae	08
14	Celastraceae	02	37	Nympheaceae	02	60	Ulmaceae	01
15	Chenopodiaceae	01	38	Ochnaceae	01	61	Lentibulariaceae	01
16	Cochlospermaceae	01	39	Oleaceae	03	62	Violaceae	01
17	Combretaceae	02	40	Onagraceae	03	63	Vitaceae	01
18	Crassulaceae	02	41	Opiliaceae	01	64	Zygophyllaceae	01
19	Cucurbitaceae	01	42	Orobanchaceae	01			
20	Dipterocarpaceae	03	43	Oxalidaceae	02			
21	Ebenaceae	01	44	Papaveraceae	01			
22	Elatinaceae	01	45	Passifloraceae	01			
23	Flacourtiaceae	02	46	Plumbaginaceae	04			

In monocotyledonous group of plants Poaceae family stands first with 29 species followed by Cyperaceae with eight species of plants only and remaining 12 families have less than five species are listed (Table 2).

Table 2: List of monocotyledonous families have less than five species found in Chamundi hills.

Sl. No.	Name of the family	No. of species
01	Agavaceae	02
02	Alismataceae	01
03	Amaryllidaceae	01
04	Aponogetonaceae	01
05	Arecaceae	03
06	Asparagaceae	02
07	Commelinaceae	03
08	Hydrocharitaceae	02
09	Liliaceae	04
10	Najadaceae	01
11	Orchidaceae	01
12	Pontederiaceae	02

At the end of the study the collected data during filed survey based on observation revealed that 11 species of rare and important plants (Table 3), 24 species of common shrubs and trees (Table 3) and 65 species of medicinally important plants were reported (Table 4).

Discussion

This study was conducted to determine the quantitative difference between plant species in Chamundi hills. It has been very interesting type of vegetation and the phenomenon of study of vegetation in Chamundi hills is very rarely documented**.** The forest cover in this hills rock ranges from any scrub vegetation to dry deciduous forest type comprising of trees, large climbers and thorny bushes. There are 483 species of flowering plants including grasses, spread under 94 families. Asteraceae, Fabaceae, Euphorbiaceae, Rubiaceae, Acanthaceae, Apocynaceae, Verbenaceae, Convolvulaceae, Fabaceae, Amaranthaceae and Lamiaceae families shows more number of species. The major part of the vegetation is dominated by Xerophytic shrubs such as *Dichostachys cinera, Dodonea viscosa, Erythroxylon monogynum, Pterolobium hexapetalum, Ziziphus mauritiana, Rhus sinuata* and *Euphorbia antiquorum*. Straggling climbers such as *Ventilago denticulata* Willd. and *Toddalia asiatica* are found.

Deciduous trees like *Albizia lebbec, Boswellia serrata, Chloroxylon swietenia* and *Cochlospermum religiosum* are notable forms. Similar work carried out by Kumar and Bhatt (2004) to document the plant diversity in six forest types of Uttaranchal, Central Himalaya, India.

Table 3: List of common and rare species found in Chamundi hills.

Sl. No.	Common shrubs and tree species	Sl. No.	Rave and important plant species
01	*Albizia amara* (Roxb.) Boiv.	01	*Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guill. & Perr.
02	*Albizia lebbeck* (L.) Benth.	02	*Cansjera rheedii* J.F. Gmel.
03	*Acacia sundra* (Rottler) Willd.	03	*Cochlospermum religiosum* (L.) Alston
04	*Ailanthus excels* Roxb.	04	*Dendrophthoe trogona* (Wight & Arn.) Danser ex Santapau
05	*Boswellia glabra* Roxb.	05	*Ehretia microphylla* Lam.
06	*Canthium parviflorum* Roxb.	06	*Firmiana colorata* (Roxb.) R. Bk.
07	*Chloroxylon swietenia* DC.	07	*Holarrhena pubescens* (Buch. Ham.) Wall. ex G. Don.
08	*Chomelia asiatica* (L.) Kuntze	08	*Holoptelea integrifolia* (Roxb.) Planch
09	*Commiphora caudata* (Wight & Arn.) Engl.	09	Shorea roxburghii G. Don.
10	*Dodonea viscosa* Jacq.	10	*Strychnos nux vomica* L.
11	*Ehretia laevis* (Rottler ex G. Don) Roxb.	11	*Ventilago denticulata* Willd.
12	*Erythroxylon monogynum* Roxb.		
13	*Euphorbia antiquorum* L.		
14	*Ficus benghalensis* L.		
15	*Flacourtia indica* (Burm. f.) Merr.		
16	*Hardwikia binata* Roxb.		
17	*Plecospermum spinosum* Trec.		
18	*Plectronia travancorcia* Bedd.		
19	*Premna flavescencs* Buch.-Ham. ex C.B. Clarke		
20	*Pterolobium hexapetalum* (Roth) Santapau & Wagh		
21	*Rhus sinuata* Thunb.		
22	*Santalum album* L.		
23	*Scutia myrtina* (Burm.f.) Kurz		
24	*Wendlandia angustifolia* Wight		

Table 4: List of medicinally important plant species found in Chamundi hills.

Sl. No.	Name of the plant	Sl. No.	Name of the plant	Sl. No.	Name of the plant
01	*Abrus precatorius* L.	24	*Cissampelos periera* L.	47	*Lannea coromandelica* (Houtt.) Merr.
02	*Abutilon indicum* (L.) Sweet	25	*Cissus quandrangularis* L.	48	*Peristrophe paniculata* (Forssk.) Brummitt
03	*Acalypha indica* L.	26	*Clerodendrum inerme* Gaertn.	49	*Phyllanthus amarus* Schumach. & Thonn.
04	*Achyranthes aspera* L.	27	*Cocculus hirsutus* (L.) W. Theob.	50	*Plumeria alba* L.
05	*Aegle marmelos* (L.) Correa	28	*Commiphora caudata* (Wight and Arn.) Engl.	51	*Pongamia pinnata* (L.) Pierre
06	*Ailanthus excels* Roxb.	29	*Curculigo orchioides* Gaertn.	52	*Catumaregam spinosa* (Thunb.) Triven
07	*Alangium salvifolium* (L.f.) Wangerin	30	*Cynodon dactylon* (L.) Pers.	53	*Scilla indica* Roxb.
08	*Albizia amara* (Roxb.) Boiv.	31	*Daemia extensa* R.Br.	54	*Sida acuta* Burm.f.
09	*Andrographis paniculata* (Burm.f.) Nees	32	*Diospyros montana* Roxb.	55	*Sida cordifolia* L.
10	*Anogeissus latifolia* (Roxb. ex. DC.) Wall. ex Bedd.	33	*Dodonea viscosa* Jacq.	56	*Stebulus aspera* Lour.
		34	*Eclipta alba* (L.) Hassk.	57	*Strychnos nux vomica* L.
11	*Aristolochia indica* L.	35	*Erythrina indica* L.	58	*Tinospora cardifolia* (Willd.) Miers
12	*Asparagus racemosus* Willd.	36	*Evolvulus alsinoidea* (L.) L.	59	*Toddalia asiatica* (L.) Lam.
13	*Azadiracta indica* A. Juss.	37	*Feronia elephantum* Corrêa	60	*Tribulus terrestris* L.
14	*Azima tetracantha* Lam.	38	*Ficus religiosa* L.	61	*Trichodesma zeylanica* (Burm.f.) R.Br.
15	*Balanites roxburghii* Planch.	39	*Fluggea leucopyrus* Willd.	62	*Vitex nigundo* L.
16	*Boerhavia diffusa* L.	40	*Gardenia gummifera* (L. f.) Baill.	63	*Withenia somnifera* (L.) Dunal.
17	*Boswellia serrata* Roxb. ex Colebr.	41	*Gmelina arborea* Roxb.	64	*Ziziphus mauritiana* Lam.
18	*Butea frondosa* Roxb.	42	*Gymnema sylvestris* (Retz.) R.Br. ex Sm.	65	*Zornia diphylla* (L.) Pers.
19	*Calotropis gigantea* (L.)W.T. Aiton	43	*Hemidesmus indicum* (L.) R. Br. ex Schult.		
20	*Cassia auriculata* L.	44	*Holarrhena pubescens* (Buch. Ham.)		
21	*Centella asiatica* (L.) Urban	45	*Jatropha curcas* L.		
22	*Ceropegia tuberosa* Roxb. Wall. ex G. Don.	46	*Morinda tinctoria* Roxb.		
23	*Chloroxylon sweitenia* DC.				

They document as *Quercus* spp. (oaks) and *Pinus roxburghii* Sarg. (Chirpine) are the major forest-forming tree species in the Central Himalayan region. Datt *et al.,* 2004, documented the floristic diversity of Corbett Tiger Reserve in Uttaranchal. The paper presented by Sharma *et al.,* in 2005 revealed the data gathered during special surveys conducted by scientists of Botanical Survey and other sister organizations on studies of plant diversity in the Siwalik ecosystems of concerned states and this paper may serve as reference for all ongoing and future plant-based developmental activities and promotion of sustainable socioeconomic development of the Siwalik Himalaya.

Acknowledgement

It is pleasure to acknowledge the University Grants Commission for providing a grant to undertake this research.

कर्नाटक राज्य, भारत के मैसूर जिले में चामुण्डी पहाड़ियों के संदर्भ में पादप विविधता का तुलनात्मक विश्लेषण

एम.एम. स्वामी, ए.एल. वीराभद्रा स्वामी और आर.पी. अनुराधा

सारांश

चामुण्डी पहाड़ियों में वनावरण शुष्क झाड़ी वनस्पति से शुष्क पर्णपाती वन किस्म तक है। सर्वेक्षण पैदल सर्वेक्षण विधि द्वारा किया गया। यहाँ पुष्पण पादपों की 483 प्रजातियां हैं, जो 94 कुलों के अन्तर्गत फैली हुई हैं। इसमें से 423 पादप प्रजातियां द्विबीजपत्रीय समूह से हैं तथा 60 पादप प्रजातियां एकबीजपत्रीय समूह से हैं। एस्टीरेसीया, फेबेसीया, यूफोर्बिएसीया, रूबिएसीया तथा पोएसीया कुल पादप प्रजातियों की उच्च संख्या के साथ पहले स्थान पर हैं। करीब 24 आम झाड़ी और वृक्षों, 11 दुर्लभ एवं महत्वपूर्ण पादपों तथा 65 औषधीय रूप से महत्वपूर्ण पादपों को क्षेत्र भ्रमण के दौरान अभिलिखित किया गया और कुछ पादप प्रजातियों को पादपालय में परिरक्षित किया गया।

References

Datt B., Rana T.S, Tariq-Husain, Pande H.C and Rao R.R. (2004). Floristic diversity of Corbett Tiger Reserve, Uttaranchal: an overview. *Phytotaxonomy*, **3**:24-31.

Kulkarni D.K. and Nipunage D.S. (2009). Floristic diversity and ecological evaluation of 'Dhup-Rahat' sacred grove from Pune district, *Geobios.*, **36**:298-302.

Kulkarni D.K. and Shindikar M. (2005). Plant diversity evaluation in Shirkai sacred grove, Pune district, Maharashtra. *Indian J. Forestry*, **28**:127-131.

Kulkarni D.K. and Kumbhojkar M.S. (1999). Dams-disaster to biodiversity in sacred groves. *The Deccan Geographer*, **37**:65-72.

Kumbhojkar M.S. and Kulkarni D.K. (1998). Environmental impact of sacred groves in Western Ghats of Maharashtra. *Sci. and Cult*., **64**:205-207.

Kulkarni D.K., Nipunage D.S., Hangarge L.M. and Kulkarni A.D. (2013). Quantitative plant diversity evaluation of sagadara and navalachi raimonotypic sacred groves in pune district of Maharashtra state, India. *Annals of Biological Research*, **4** (2):234-240.

Kumar A. and Bhatt J. (2004). Plant diversity in six forest types of Uttaranchal, Central Himalaya, India. *Current Science*, **86** (7):975-978.

Irshad S. and Khan S. (2012). Impacts of Protection on Floral Diversity of Himalayan Moist Temperate Forests of Galyat, Pakistan. *J. Environment*, **1** (4):119- 125.

Sharma J.R, Singh S. and Uniyal B.P., (2005). Plant diversity in Siwalik Himalaya. *Indian J. Forestry,* **28** (3):321-337.