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Floristic diversity of Shankaracharya forest ecosystem

Mohmad Abass Bhat
Department of Environmental Science, University of Kashmir, Srinagar, Jammu and Kashmir, India

Abstract
Forest ecosystems are among the largest terrestrial ecosystems inhibiting a vast majority of the biodiversity characterized by their own peculiar floral diversity. The present study was carried to investigate the floristic diversity of the Shankaracharya hill ecosystem situated in south-east of Srinagar city. At present stage of investigation, 125 species of plants distributed under 93 Genera and 44 families were found in the area. The area is dominated by Herbs having (69 sp.) followed by trees (31 sp.), shrubs (23 sp.) and climbers (2 sp.). The study revealed that Dicots form the major component followed by the Monocots and Gymnosperms. Among the Dicots, Rosaceae is the largest family with 21 species and among Monocots; Poaceae is the largest family with 10 species.

Keywords: flora, dicots, monocots, genera, gymnosperms, biodiversity, Shankaracharya

Introduction
Planet earth is endowed with a rich variety of life forms with millions of living organisms forming an intricate web of life and providing basis for the existence of life on the earth (Pandey 1996). Various life forms starting from the unicellular primary producers to the complexly built higher plants and animals is a unique feature of this green planet making it what is known as biological diversity (Aradhana, 1998) [1]. This diversity of species has been well knit by the laws of nature and may be therefore defined as the variety and variability among the living organisms and the ecological complexes in which they occur (Dobson, 1998) [6]. Ever since, the advent of life on earth, the plants have enacted as corner stone in carrying forward the complex intricate system of biosphere. By virtue of being producers and their indispensable role it becomes essential to know about the different kinds of plants growing in the different geographical regions and to provide a systematic listing and diagnostic description of them. Numerous floristic studies in the Kashmir region during last two centuries have been done but a lot more still needs to be done in this field, as many areas are still under explored or unexplored. The present study is an attempt to explore and document the floristic diversity of the Shankaracharya forest range, which has received very little attention till date.

Study area and Study sites
The Shankaracharya or Takht-e-Suleiman as it is often referred to forms a part of inner or great Himalayas. It lies between 34°5' to 34° 6' N latitudes and 74° 49' to 74° 51' E longitudes on the south-east side of Srinagar at a distance of about 4.5 km from the heart of city. The average height of the hill is 1886 meters a.s.l. with a total area of about 142 hectares (Dhar, *et al*. 2002) [5]. To study the floristic diversity of the area, four sites were selected:

Site-I: This site lies at an altitude of 1810m a.s.l. and is situated towards south-western side.

Site-II: It is found at an altitude of 1780m a.s.l. towards the southern side.

Site-III: It lies at an altitude of 1660m a.s.l. towards north-eastern side.

Site-IV: This site lies at an altitude of 1610m a.s.l. towards northern side facing the Dal Lake.

Materials and Method
For studying the floristic diversity of the area, the methodology applied was divided into two phases:

Phase-I: Collection: During the first phase of study, the periodic visits were conducted on the fortnightly basis so that extensive plant material collection and exploration could be done. The area was thoroughly surveyed in peak and dull seasons of the flowering taking care of the micro and macro habitats. The material was collected in the polythene bags, sealed and labeled instantly. It was then pressed, dried and mounted on herbarium sheets of standard sizes.

Phase-II Identification: The second phase includes the identification of the collected plant material which was done in the KASH (Kashmir University Herbarium), Department of Plant Taxonomy, University of Kashmir by the experts available there. The specimens were deposited in the department for future reference.

Observations and Discussion
The present study revealed that the Shankaracharya forest range represents diverse number of species as has been earlier reported by (Javeid, 1970) [7].
The area harbors about 125 plant species belonging to 94 genera under 44 families.

This small area is enriched with diverse flora predominantly herbaceous (69 sp.) accounting to 55.2% of the flora, followed by trees (31 sp.) accounting to 24.80%, shrubs (23 sp.) accounting to 18.40% and climbers (2 sp.) accounting 1.6% (Fig.1).

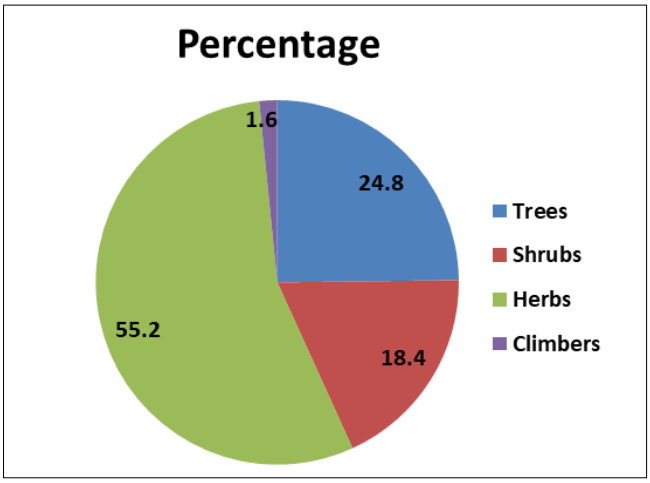

Fig 1: Percentage of Various Components Recorded from the Study Area.

The major floral component of study area is represented by Dicots (100 sp.) followed by Monocots (17 sp.) and Gymnosperms (5 sp.). About 44 families exist in the area with about 25 monotypic families i.e. families with single species. Similarly out of 94 genera, 76 are with only one plant species (Table.1).

Table 1: Statistical Analysis of Floral Diversity of Study Area.

Components	No. of Species	%age	No. of Genera	%age	No. of Families	%age
Monocots	17	13.60	15	15.96	06	13.60
Dicots	100	80.0	71	75.54	33	75.00
Gymnosperms	05	4.00	05	5.32	02	4.54
Pteridophytes	02	1.60	02	2.12	02	4.54
Mosses	01	0.80	O1	1.06	01	2.28
Total	125		94		44	

The results reveal that there is less diversity of species within the genera and within the families. The proportion of genera to species ratio in the study area is 1:1.3 as against 1:2.8 in the Kashmir and 1:7 in India, Dhar and Kachroo, 1983 [5], supporting the generalization that smaller the flora, smaller the genus: species ratio (Table.2).

Table 2: Ratio of Higher to Lower Taxa in the Flora of Study Area.

Taxa	Family: Species	Family: Species	Family: Species
Monocots	1:2.8	1:2.5	1:1.1
Dicots	1:3.0	1:2.2	1:1.4
Gymnosperms	1:2.5	1:2.5	1:1
Pteridophytes	1:1	1:1	1:1
Mosses	1:1	1:1	1:1
Total	1:2.8	1:2.1	1: 1.3

The study also revealed that among the four selected sites, site–IV has maximum of 40 species (32%) followed by site–I with 35 species (28%).This is because of less presence of trees which lead to more penetration of light and therefore more diversity of herbs and shrubs. Site–II and site–III harbors less plant species probably due to presence of large conifers and other deciduous trees which shadow the major area at these sites (Table.3).

Table 3: Percentage of Various Taxa Recorded from the Selected Sites of Study Area.

Sampling Site	No. of Species	%age	No. of Genera	%age	No. of Families	%age
Site–I	35	28.0	31	32.97	17	39.63
Site–II	29	23.20	25	26.59	18	40.90
Site–III	21	16.80	15	15.95	11	25.0
Site–IV	40	32.0	38	40.42	22	50.0

The thorough study revealed that the lower area is mostly dominated by plants like *Prunus armenica*, *Robinia pseudoacacia*, *Celtis australis*, *Morus alba*, *Aesculus hippocastanum* etc. along with shrubs like *Rosa webbiana*, *Crataegus songarica*, *Cotoneaster aitchsonii*, *Rosa ulmifolis*. The deciduous plants are most conspicuous in lower areas along with scattered conifers while higher areas are mostly dominated by conifers like *Cedrus deodara*, *Pinus halepensis*, *Cupressus semipervensis*, *Thuja orientalis*. The higher areas have many herb species *like Cynodon dactylon*, *Codonapsis ovata*, *Tragapogan kashmirianus*, *Vebascum thapsus*, *Sorghum vulgare* etc. The area harbours many medicinal plants like *Artemisia absinthium* Linn., *Artemisia moorcroftiana*, *Foeniculum vulgare*, *Lavatera kashmeriana*, *Mentha longifolia*, *Malva neglecta*,*Viola odorata* etc. which have been already reported in earlier studies by Dar, *et al*. (2002) [4]; Bhat, N. A. (2002) [2].

Conclusions

The floristic study of the Shankaracharya forest ecosystem revealed that area represents about 125 plant species belonging to 94 genera under 44 families. The area is dominated by herbs followed by trees and shrubs in terms of number of species. Dicots form the major component followed by Monocots, Gymnosperms, Pteridophytes and Mosses as is evident from the ratio 100:5:17:2:1. Among Dicots, the largest family in the study area is Rosaceae with 21 species and for Monocots the largest family is Poaceae with 10 species. In terms of genera, Rosaceae is also the largest family with 9 genera followed by Asteraceae with 8 genera. Out of total 44 families, 25 families within 76 genera are represented by single species i.e. they are monotypic.

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