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Floristic Diversity in and around Govt. Degree College for Women Anantnag

Mohd Shahijahan Dar

Department of Botany, Govt Degree College for Women, Anantnag Kashmir

Abstract

The present study carried out from January 2020 to June 2021 within an area of approximately 1.5 Km provides comprehensive information on floristic diversity and management plan for conservation of plants in and around Govt. Degree College for women Anantnag, UT of (j&k) India. A total of 85 plant samples both cryptogams and phanerogams belonging to 77 genera and 41 families were recorded from the study area. Out of the documented species, 77 were herbs (90%), 03 shrubs (3%) and 05 trees (7%). Among cryptogams, pteridophytes were dominant with (04 genera, 04 species) followed by bryophytes with (02 genera and 02 species) and among phanerogams, Dicotyledons were represented by (70 genera, 64 species and 31 families) followed by monocotyledons (07 genera, 07 species and 02 families), whereas gymnosperms were represented by only (01 genera and 01 species). The study revealed that Dicots form the major component (81%) followed by the Monocots (5%) and Pteridophytes (5%). The most prominent family prevailing in the area of study among monocots was Poaceae (06 genera and 06 species) contributing (7%) while among the dicots, Asteraceae was the largest family contributing 10% with (15 genera and 16 species) followed by Lamiaceae (8%) with (06 genera and 07 species) respectively. There was predominance of herbaceous plant samples.

Key Words: GCW, Anantnag, Floristic diversity, PlantNet.

Introduction

Plant diversity refers to the existence of wide variety of plant species in their natural habitat. Plants including herbs, shrubs and trees belonging to Bryophytes, Pteridophytes and different species of flowering plants play a key role in ecosystems (**Dey et al 2021**). The 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**). The plant community plays a pivotal role in sustainable management by maintaining biodiversity and conserving the environment (**Gaur et al., 1993; Aswal, 1996; Dhar, 1996; Farooquee and Saxena, 1996**). Plants are precious gifts of nature which are the sources of food and medicinal compounds while also providing raw materials for many industries.

Most of the life forms cannot exist without plants. Plants are very useful in educational studies. In order to know the number of rare species, medicinal and ecologically important plants present in a habitat and their conservation and protection from the environment, diseases and pathogens, there is a dire need to study the plant diversity. The knowledge of the floristic composition of a plant community is a prerequisite to understand the overall structure and function of any ecosystem **(Ballabha et al 2014)**.

Biodiversity is essential for human survival and economic well-being, ecosystem function and stability **(Singh, 2002)**. But due to the major threats to plant diversity including habitat loss, fragmentation and degradation, overexploitation, invasive species, pollution and anthropogenic climate change, many of the species have decreased to a great extent. The degradation of biodiversity in the Himalayan region has reached dangerously at alarming state **(Gupta, 1960; Gaur, 1999)**. Perhaps a third of all angiosperms are at risk of extinction, including most of those that have not yet been described, or are described but otherwise data deficient **(Pimm and Jopa, 2015)**.

The conservation of plant diversity has received considerably less attention than the conservation of animals, perhaps because plants lack the popular appeal of many animal groups **(Goettsch et al 2015)**. As a result, plant conservation is greatly under resourced in comparison with animal conservation **(Havens et al 2014)**. Conservation of biodiversity is a massive task if viewed globally, but the combination of a well-designed and well managed protected area system should work anywhere **(Corlett 2016)**.

Complete documentation of the plant diversity from each geographical location is necessary to unravel the natural diversity prevailing in that location, its distribution and to devise strategies for the conservation of threatened plant species **(Dey et al 2021)**. 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 **(Abbas Bhat, 2020)**. Keeping this all in view, an attempt has been made to document the plant diversity within an area of ~ 1.5 Km in and around Govt. Degree College for Women, Anantnag UT of Jammu and Kashmir India through collection and identification of plant samples which will be very useful for the students to conduct taxonomical and ecological studies on plant sciences. The present data has its importance recorded for the first time.

2. Materials and Methods

Study Area

The area of study lies between 33.73° N 75.15° E at an elevation of 5, 3000 feet (1,600m) above sea level. The area is situated in Anantnag town which is the district headquarter and is at a distance of 55 kilometres from Union territory summer capital Srinagar on NH44. It is situated in the north east of Kashmir valley. The district is bounded in south and east by the Peer Panchal mountain range whereas in the North West, it is bounded by Pulwama and Kulgam districts. The eastern and the southern hills of the district are covered with thick and dense forests. It is the third largest city in Jammu and Kashmir after Srinagar and Jammu with an urban agglomerate population of 159,838 and municipal limit population of 109,433 (Census, 2011).

Climate

The district experiences severe cold during the winter season when the temperature falls below the freezing point. In the summer season, the temperature normally goes upto 35C⁰. The district gets moderate amount of rainfall during the spring and the summer seasons. The snow falls during the winter months and upper areas receive heavy snowfall as compared to plain areas. March and April months are generally rainy. The soil of the study area is by and large rich in organic matter and the productivity of soil in plains is high whereas in hilly areas, it is low.

Methodology

A study from January 2020 to May 2021 was carried out by the authors within an area of approximately 1.5 KM radius in and around Govt. Degree College for Women near K.P road, Anantnag Kashmir for the study of plant diversity. The plant specimens were sampled by random sampling method (Diekmann *et al.*, 2007). Before the collection, the plant samples were photographed with high resolution camera in their natural habitat and saved so that later they can be identified by using android mobile based apps. The map of the area studied is shown in (Fig.1).

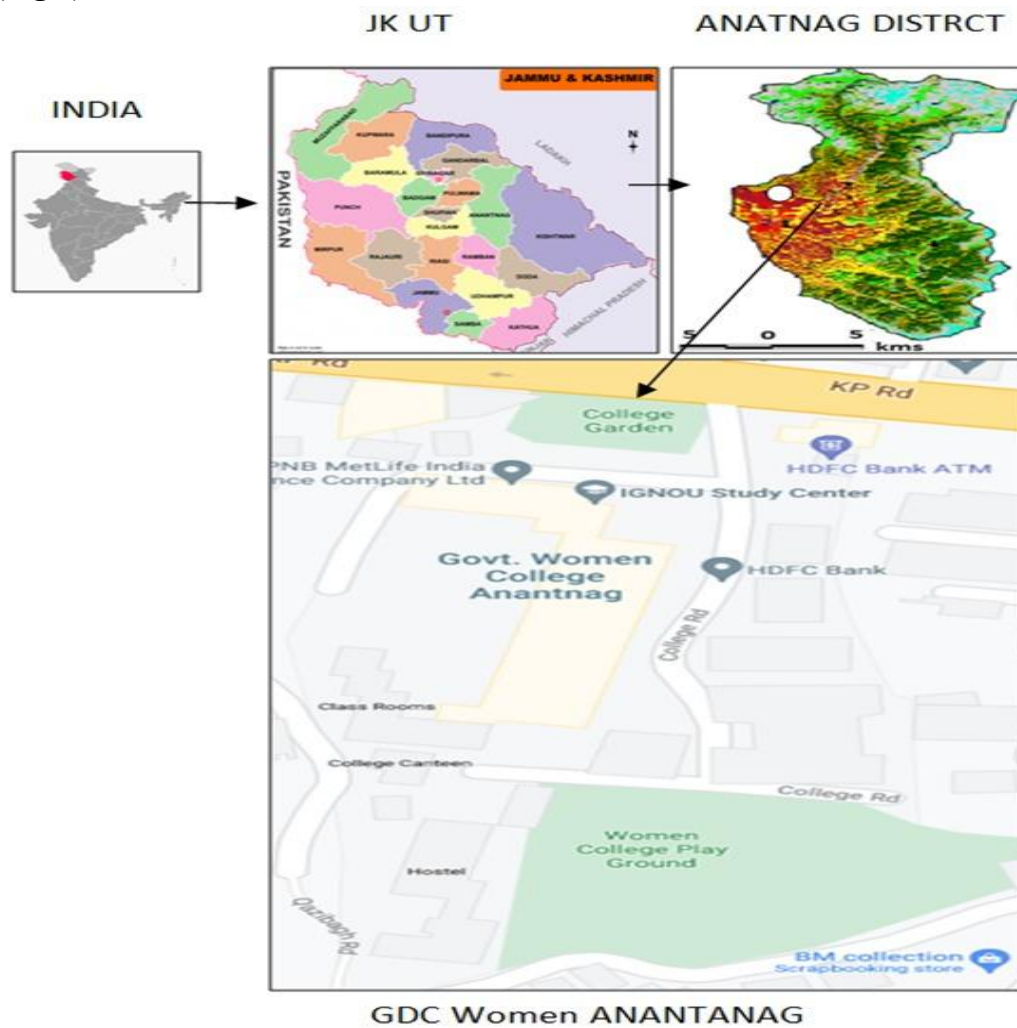


Fig.1: Map of the study area

Collection and Identification of Plant Samples

The plants which were good in condition that is free of diseases were selected carefully in the field. Prevalent plant species were collected from the study area and non-prevalent ones were only photographed and described. Utmost care was taken for endangered and rare plants present in the area of study. An attempt was made to collect the plants during flowering and fruiting period in their natural habitat for easy identification and habitat recognition.

As botany teachers, we were familiar with the local names of most of the plant specimens collected. We could easily then search the botanical names of these plant samples from the internet by using android mobile based apps such as PlantNet, PictureThisFlower & Plant Identification application through which we received several plant details such as botanical names, family details, common names and images. Some plants were identified by seeking help from local people residing near the area.

Final help for the identification of some unidentified plant specimens were taken from the faculty of Botany, University of Kashmir who identified these plants on the basis of combination of morphological and floral characters.

Results and Discussion

A total of 85 different plant species belonging to 77 genera and 41 families were collected during the investigation. The total list of all plant species collected during this diversity study, their botanical names, common names, vernacular names, habit and family details are listed in **Table I**.

Table- 1: List of total plant species collected during the diversity studies, their family details, common names and vernacular names.

S.No	Botanical Name	Family	Habit	Common Name	Vernacular Name
Cryptogams/Algae					
1	<i>Spirogyra sp.</i>	Zygnemataceae		Blanket weed/Water Silk	Shill
Cryptogams/Bryophytes					
2	<i>Funaria Sp.</i>	Funariaceae	Herb	Cord Moss	Kaay
3	<i>Marchantia</i>	Marchantiaceae	Herb	Umbrella liverwort	Chatar-Kaay
Cryptogams/Pteridophytes					
4	<i>Adiantum cappilus veneris</i>	Adiantaceae	Herb	Walking Fern	Gewtheer
5	<i>Equisetum arvense</i>	Equisetaceae	Herb	Horsetail	Sategand
6	<i>Dryopteris blanfordii</i>	Dryopteridaceae	Herb	Wood Fern	Deid/Kunji
7	<i>Marsilea quadrifolia</i>	Marsileaceae	Herb	Waterclover	Sushni
Phanerogams/Gymnosperms					

8	<i>Thuja orientalis</i>	Cupressaceae	Tree	Chinese Arborvitae	Sarwa Kul
Phenerogams/Angiosperms/Monocotyledons					
9	<i>Cyanodon dactylon</i>	Poaceae	Herb	Bermuda/Dhoob Grass	Dramunn
10	<i>Hordeum spontaneum</i>	Poaceae	Herb	Wild Barley	Jungli Woush
11	<i>Bromus latiglumis</i>	Poaceae	Herb	Brome Grass	Khor Ghas
12	<i>Polypogon viridis</i>	Poaceae	Herb	Water bent	Aabi Ghass
13	<i>Lolium perenne</i>	Poaceae	Herb	Ryegrass	Krip
14	<i>Poa pratensis</i>	Poaceae	Herb	Smooth meadow grass	Nila Ghass
15	<i>Iris kashmiriana</i>	Iridaceae	Herb	Kashmir iris	Mazar-mund
Phenerogams/Angiosperms/Dicotyledons					
16	<i>Chenopodium album</i>	Chenopodiaceae	Herb	Goosefoot	Jungli Palak
17	<i>Amaranthus caudatus</i>	Amaranthaceae	Herb	Tumbleweed	Leesa
18	<i>Artimisia absinthium</i>	Asteraceae	Herb	Common Wormwood	Tethwan
19	<i>Taraxacum officinale</i>	Asteraceae	Herb	Dandelion	Hund
20	<i>Sonchus asper</i>	Asteraceae	Herb	Sow Thistle	Doudejh
21	<i>Parthenium hysterophorus</i>	Asteraceae	Herb	Carrot Grass	Gajri Gass
22	<i>Saussurea costus</i>	Asteraceae	Herb	Indian Costus	Kouth
23	<i>Cannabis sativa</i>	Cannabinaceae	Herb	Indian Hemp	Bhangeh
24	<i>Euphorbia helioscopia</i>	Euphorbiaceae	Herb	Umbrella Milkweed	Gursochal
25	<i>Vicia sativa</i>	Fabaceae	Herb		Kadeh katch
26	<i>Trifolium repens</i>	Fabaceae	Herb	White Clover	Batekh nued
27	<i>Salvia pratensis</i>	Lamiaceae	Herb	Kashmir Salvia	Shollar
28	<i>Mentha piperita</i>	Lamiaceae	Herb	Peppermint	Pudina
29	<i>Thymus serpyllum</i>	Lamiaceae	Shurb	Wild Thyme	Jungli Javind
30	<i>Morus alba</i>	Moraceae	Tree	Mulberry	Tul
31	<i>Oxalis latifolia</i>	Oxalidaceae	Herb	Wood Sorrel	Tsok Tsin
32	<i>Plantago ovata</i>	Plantaginaceae	Herb	Isabgol	Boud Gull
33	<i>Plantago lanceolate</i>	Plantaginaceae	Herb	Lamb's Tongue	Gull/Chamchi Pattar
34	<i>Rumex nepelensis</i>	Polygonaceae	Herb	Nepal Dock	Abujh
35	<i>Salix alba</i>	Salicaceae	Tree	White Willow	Boteh Veer

36	<i>Salix caprea</i>	Salicaceae	Tree	Goat Willow	Beyd Mushk
37	<i>Nepeta cataria</i>	Lamiaceae	Herb	Catnip/ Catmint	Gandeh soi
38	<i>Urtica dioca</i>	Urticaceae	Herb	Stinging Nettle	Soi
39	<i>Datura stramonium</i>	Solanaceae	Herb	Thorn Apple	Datur kul
40	<i>Typha angustifolia</i>	Typhaceae	Herb	Cat Tail	Petch
41	<i>Convolvulus arvensis</i>	Convolvulaceae	Herb	Field Bindweed	Thude posh
42	<i>Capsella bursa pastoris</i>	Brassicaceae	Herb	Shepherd's Purse	Kral Mound
43	<i>Celosia argentia</i>	Amaranthaceae	Herb	Silver Cock's Comb	Mawal
44	<i>Cichorium intybus</i>	Asteraceae	Herb	Chicory	Kasneel Hund
45	<i>Foeniculum vulgare</i>	Apiaceae	Herb	Fennel	Badiyaan
46	<i>Marrubium vulgare</i>	Lamiaceae	Herb	White horehound	Tropad
47	<i>Mentha longifolia</i>	Lamiaceae	Herb	Mint	Pudneh
48	<i>Prunella vulgaris</i>	Lamiaceae	Herb	Woundwort/Self Heal	Kal wyuth
49	<i>Malva neglecta</i>	Malvaceae	Herb	Dwarf Mallow/Button weed	Sochal
50	<i>Malva sylvestris</i>	Malvaceae	Herb	Tall Mallow	Sochal
51	<i>Sisymbrium leoselli</i>	Brassicaceae	Herb	London Rocket	Cheri Laschij
52	<i>Solanum nigrum</i>	Solanaceae	Shrub	Black Nightshade	Kambai
53	<i>Cotula anthemoides</i>	Asteraceae	Herb	Buttonweed	Thol Babul
54	<i>Anthemis cotula</i>	Asteraceae	Herb	Stinking Chamomile	Phukk Gass
55	<i>Portulaca oleraceae</i>	Portulacaceae	Herb	Common Purslane	Nunner
56	<i>Platanus orientalis</i>	Platanaceae	Tree	Oriental Plane	Boonie
57	<i>Lavatera kashmiriana</i>	Malvaceae	Herb	Tree Mallows	Sazposh
58	<i>Rubus fruticosus</i>	Rosaceae	Shrub	Blackberry	Chaanch
59	<i>Aesculus indica</i>	Sapindaceae	Tree	Indian Horse Chestnut	Handoon
60	<i>Anagallis arvensis</i>	Primulaceae	Herb	Scarlet Pimpernal	Chari Saban
61	<i>Veronica persica</i>	Plantaginaceae	Herb	Bird's Eye	Licchi Kachh
62	<i>Gallium aparine</i>	Rubiaceae	Herb	Sticky weed	Kuri
63	<i>Conyza canadensis</i>	Asteraceae	Herb	Horse Weed	Daryaibooti
64	<i>Fragaria vesca</i>	Rosaceae	Herb	Wild strawberry	Ingra, MawKual
65	<i>Verbascum Thapsus</i>	Scrophulariaceae	Herb	Common mullein	Wan Tamook
66	<i>Ranunculus arvensis</i>	Ranunculaceae	Herb	Field buttercup	Thonil

67	<i>Xanthium strumarium</i>	Asteraceae	Herb	Burweed	Gokhru
68	<i>Potentilla anglica</i>	Rosaceae	Herb	Trailing tormentil	Ratanjot
69	<i>Persicaria maculata</i>	Polygonaceae	Herb	Jesus Plant	Marchwangun gassa
70	<i>Artemisia annua</i>	Asteraceae	Herb	Sweet wormwood	Tethwen
71	<i>Galinsoga parviflora</i>	Asteraceae	Herb	Potato weed	Shal-e-lot
72	<i>Geranium maculatum</i>	Geraniaceae	Herb	Wild geranium	Kaw ashud
73	<i>Ranunculus sceleratus</i>	Ranunculaceae	Herb	Celery buttercup	Thanil posh
74	<i>Arctium minus</i>	Asteraceae	Herb	Common burdock	Cheerkachh
75	<i>Conium maculatum</i>	Apiaceae	Herb	Carrot fern	Mohre kach
76	<i>Asperugo procumbens</i>	Boraginaceae	Herb	Madwort	-----
77	<i>Potentilla reptans</i>	Rosaceae	Herb	Creeping tormentil	Marroach
78	<i>Ranunculus muricatus</i>	Ranunculaceae	Herb	Bur buttercup	-----
79	<i>Centaurea calcitrapa</i>	Asteraceae	Herb	Red star thistle	
80	<i>Tragopogon dubius</i>	Asteraceae	Herb	Goat's beard	
81	<i>Cuscuta compestris</i>	Convolvulaceae	Herb	Dodder	
82	<i>Vinca difformis</i>	Apocyanaceae	Herb	Intermediate periwinkle	
83	<i>Rorippa sylvestris</i>	Brassicaceae	Herb	Creeping yellow cress	
84	<i>Matricaria camomilla</i>	Asteraceae	Herb	German chamomile	
85	<i>Trigonella foenum-graecum</i>	Leguminosae	Herb	Fenugreek	Meth

Out of the total 85 plant species collected, 07 were cryptogams (01 Algae, 02 Bryophytes, 04 Pteridophytes) and 78 were phanerogams including 01 Gymnosperm and rest 77 being Angiosperms (07 monocotyledons and 70 Dicotyledons). (**Fig.2**)

A number of cryptogamic plants were sampled during this study, including *algae*, *Marchantia* sp., *Funaria*, *Dryopteris* sp., *Adiantum* sp., *Equisetum* sp. and *Marsilea* sp. (**Plate.1**). Among monocotyledons, the most prominent family was Poaceae (06 genera and 06 species) followed by Iridaceae with only 01 genera and 01 species (**Plate.2**).

*Hordeum spontaneum**Bromus latiglumis**Polypogon viridis**Lolium perenne**Cyanodon dactylon**Poa pratensis**Iris kashmiriana*

Plate.2: Plants of family Poaceae and Iridaceae collected from the study site

Among dicotyledons, the most represented families in this region depicted in (Table 2) were Asteraceae (15 genera and 16 species) followed by Lamiaceae (06 genera and 07 species), Rosaceae (03 genera and 04 species), Brassicaceae (03 genera and 03 species), Malvaceae and Platanaceae (02 genera and 03 species each), Fabaceae, Solanaceae, Amaranthaceae, Apiaceae, Polygonaceae and Convolvulaceae (02 genera and 02 species each), Ranunculaceae (01 genera and 03 species), Salicaceae (01 genera and 02 species).

A total of 25 families remained monospecific and were represented with only one species from the study area, such as members from Portulacaceae, Rubiaceae, Cannabinaceae, Primulaceae, Moraceae, Sapindaceae, Platanaceae, Urticaceae, Euphorbiaceae, Oxalidaceae, Typhaceae, Funariaceae, Zygnemataceae, Marchantiaceae, Adiantaceae, Equisetaceae, Dryopteridaceae, Marsileaceae, Cupressaceae, Chenopodiaceae, Boraginaceae, Geraniaceae, Apocyanaceae, Leguminosae and Scrophulariaceae. The family-wise distribution of plants illustrating the most dominant and least prevalent families is shown in (Fig.2). The plant samples can be categorized

into herbs (90%), shrubs (3%), trees (7 %), (**Fig.3**) .Out of 85 plant samples covering 41 families studied, herbs were represented by 77 species, followed by 05 species of trees and 03 species of Shrubs. Majority of plant samples collected were herbaceous in nature.

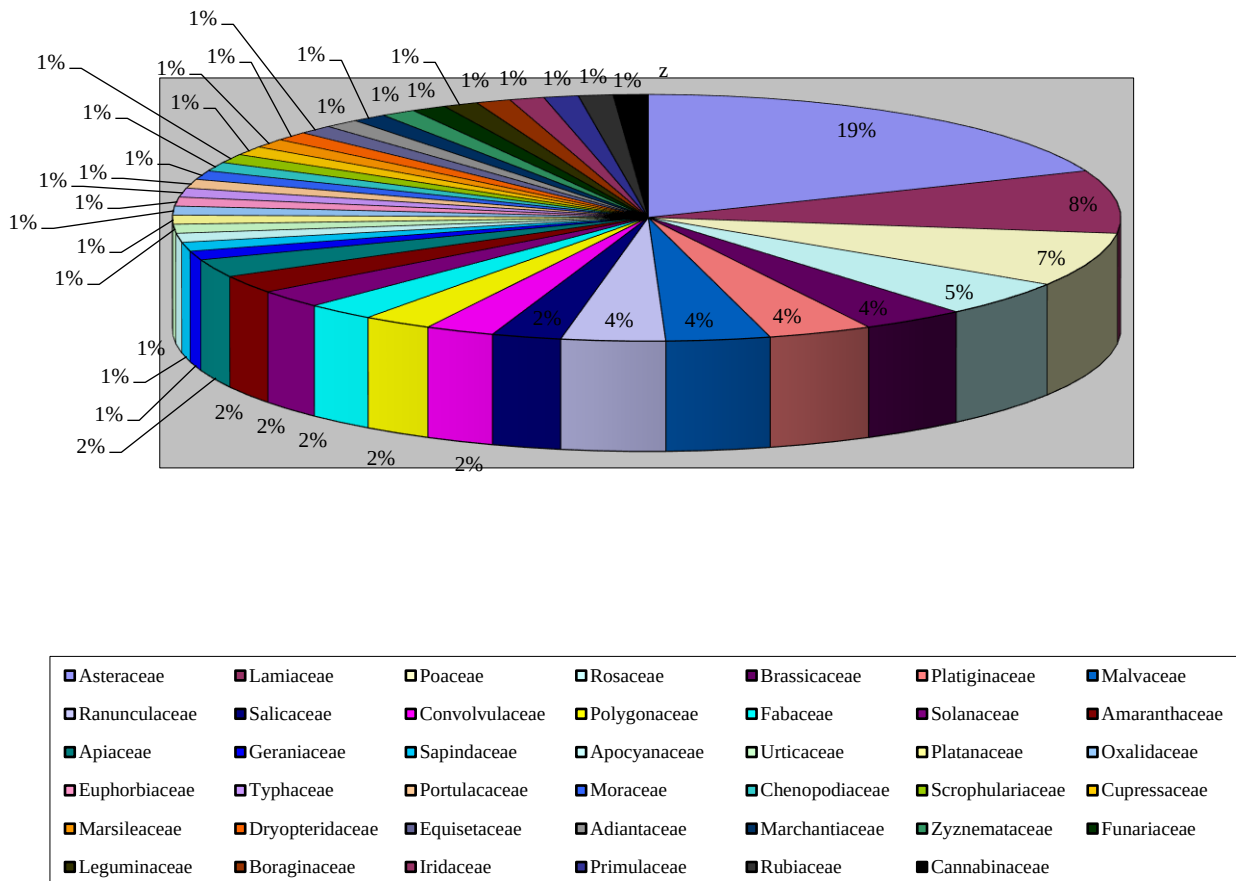


Fig.3. Prevalence of Plant Families in study area (%)

Our study area was also filled with a number of weeds. Some of the well-known prevalent weed samples included *Parthenium hysterophorus*, *Veronica persica*, *Capsella bursa-pastoris*, *Trifolium repens*, *Cannabis sativa*, *Rumex nepalensis* etc.

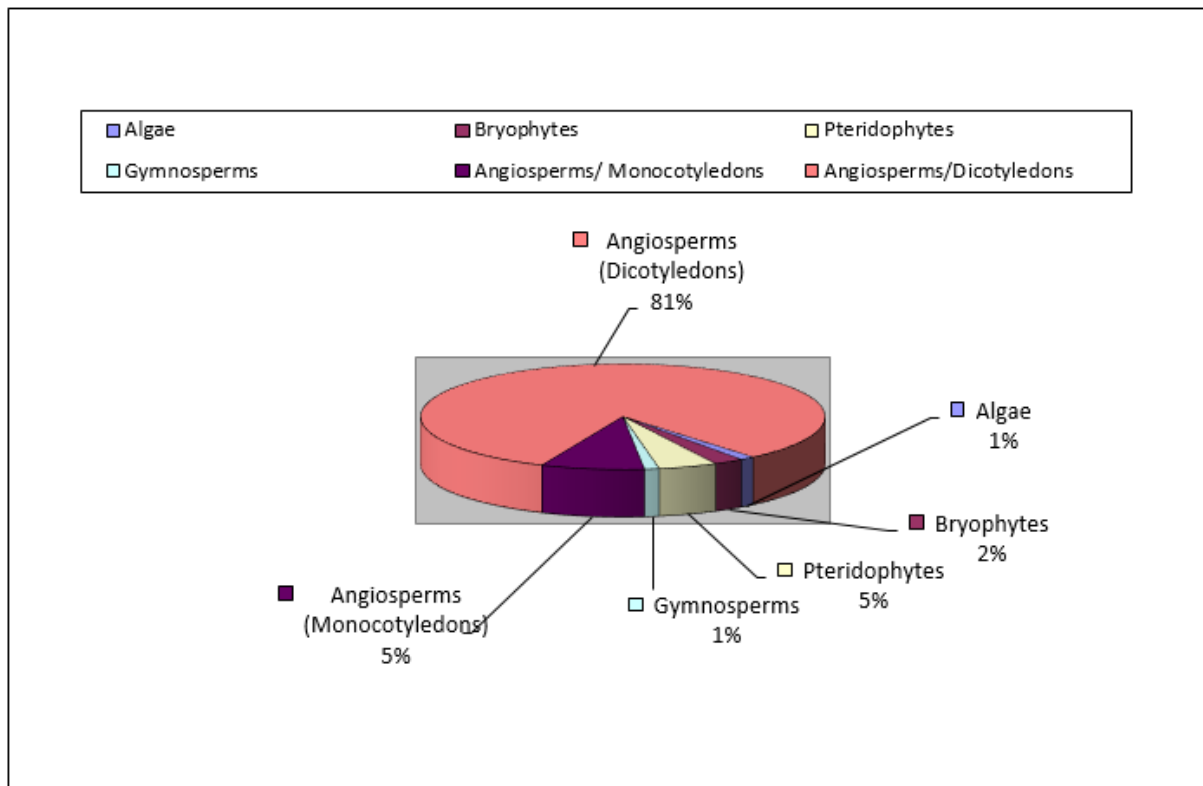


Fig.2: Diversity of Plant Samples collected (%)

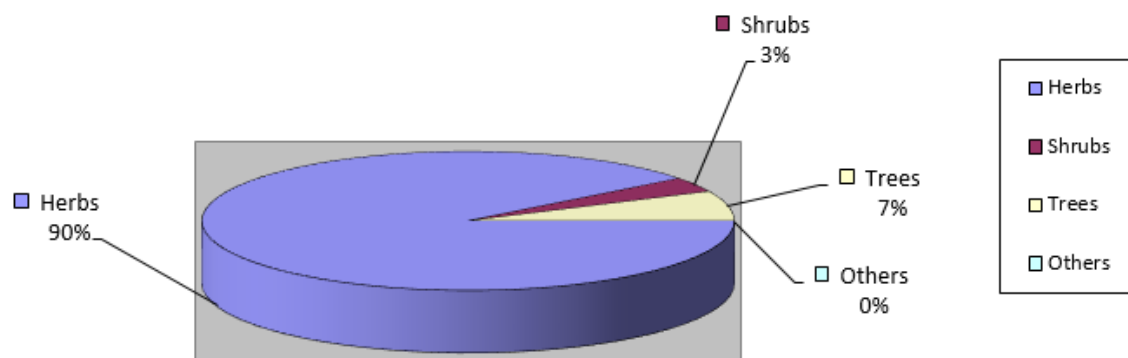


Fig.3: Categorization of plant samples into different categories based on the habit of the plants.



Solanum nigrum



Marrubium vulgare



Matricaria camomilla



Verbascum thapsus



Xanthium strumarium



Cichorium intybus



Potentilla reptans



Gallium aparine

*Euphorbia helioscopia**Salvia pratensis**Malva neglecta**Taraxacum officinale**Foeniculum vulgare**Sonchus asper**Mentha longifolia**Sisymbrium leoselli*

*Ranunculus arvensis**Veronica persica**Conyza canadensis**Trifolium pratense**Nepeta cataria**Potentilla anglica**Persicaria maculosa**Artemisia annua*

*Geranium maculatum**Ranunculus sceleratus**Arctium minus**Conium maculatum**Chenopodium album**Cannabis sativa**Rumex nepelensis**Asperugo procumbens**Convolvulus arvensis**Typha angustata**Artemisia absinthium**Plantago ovata**Urtica dioica**Capsella bursa pastoris**Plantago lanceolata**Mentha piperita*



Fig. 4: Different Phanerogamic plants collected in and around GCW, Anantnag.

Conclusions

The study area is rich in plant diversity with members belonging to Algae, Bryophytes, Pteridophytes, Gymnosperms, herbs, shrubs, trees etc. The area represents about 85 plant species belonging to 77 genera under 41 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, Pteridophytes, Mosses and gymnosperms. Among Dicots, the largest family in the study area is Asteraceae with 16 species and for Monocots the largest family is Poaceae with 06 species. In terms of genera, Asteraceae is also the largest family with 15 genera followed by Lamiaceae with 6 genera. Out of total 41 families, 26 families within 77 genera are represented by single species i.e. they are monotypic. The majority of these plant samples were herbaceous.

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