

Species diversity and biological spectrum of the flora of Sri Pratap College, Srinagar, J&K, India

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Abstract: Species diversity is an appropriate term for ecologists who are interested in understanding the mechanisms and effects of certain ecological phenomena, such as pollution, environmental disturbances, etc. The present study was undertaken with objectives to list the species richness and to study their ecological characteristics (like life form and biological spectrum) of the plants growing in the S.P. College, Srinagar. A total of 224 plant species, 216 angiosperms (184 dicotyledons and 32 monocotyledons) and 8 gymnosperms were growing in S.P. College, Srinagar. Total 57 dicotyledons and 9 monocotyledons families of angiosperms were present. The percentage contribution of dicots and monocots was 85.19 and 14.81%, respectively. The Gymnosperms constituted 3.57% of the total plants reported.

Key words: Angiosperms; biological spectrum; gymnosperms; S.P. College; species diversity.

Introduction

Species diversity is an appropriate term for ecologists who are interested in understanding the mechanisms and effects of certain ecological phenomena, such as pollution, environmental disturbances, etc. Species diversity has functional consequences because the number and kinds of species present determine the organismal traits that influence ecosystem processes. Species traits may mediate energy and material fluxes directly or may alter abiotic conditions (for example, limiting resources, disturbance and climate) that regulate process rates. The components of species diversity that determine this expression of traits include the number of species present

(species richness), their relative abundances (species evenness), the particular species present (species composition), the interactions among species (non-additive effects), and the temporal and spatial variation in these properties (Margalef, 1958; Lloyd and Ghelardi, 1964; Pielou, 1966; Spellerberg, 1991; Chapin III *et al.*, 2000).

Habitat destruction and the introduction of exotic species are causing the extinction of many native species (Diamond, 1989). At a global level, these losses are causing a decrease in total biodiversity (Diamond, 1989; Smith *et al.*, 1993; Morris and Heidinga, 1997; McKinney and Lockwood, 1999). At sub-global scales, losses of native species can be offset by the establishment of exotic species, which can sometimes cause a net increase in diversity for specific regions or locations (Sax, *et al.*, 2002).

A plant life-form is usually understood as a growth form that displays an obvious relationship to key environmental factors (Mueller-Dombois & Ellenberg 1974), being characterized by the adaptations of plants to certain ecological conditions, as, for example, mean annual temperature or precipitation (Mera *et al.*, 1999). According to Box (1981), the study of plant life-forms is important for the following reasons: plant life-forms provide the basic structural components of vegetation stands, being the most obvious level of subdivision for describing and explaining

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vegetation structure; primary physiological processes of plants are controlled by aspects of plant form; and plant form provides an useful means of getting at general principles of plant-environment relations without becoming mired in taxonomic detail (Batalha and Martins, 2002).

Listing of species richness of an area provides the benchmark information of the diversity of the locality at a particular time and also helps in temporal assessment of the vegetation, whereas the life-form spectrum will give the status of relationship between the vegetation and environment. In view of the above mentioned points and concerns the present study was undertaken with objectives to list the species richness and to study their ecological characteristics (like life-form and biological spectrum) of the plants growing in the S.P. College, Srinagar.

Material and Methods

Study Site

The study was conducted in the S. P. College, Srinagar. The college is situated approximately half a kilometre from the clock tower at the bank of a canal of Dal Lake.

Methodology

The plant samples were collected, pressed and finally pasted on the herbarium sheet. The identification was done by using the floras (Singh and Kachroo, 1976; Swarup, 1997; Bhat, 2002), and expert taxonomist of the

Department of Botany, S.P. College, Srinagar. We also consulted Kaul (1986 and 1997) and Bhat (2002) for studying weedy character of the plants.

The term life form, in general refers to the shape or appearance of an organism. Raunkiaer (1934) defined life-forms as '*the sum of the adaptation of a plant to climate*'. He classified the plant species into five life-forms viz. phanerophytes (P), chamaephytes (Ch), hemicryptophytes (H), cryptophytes (Cr) and therophytes (Th). In this study we have used this classification and also prepared biological spectrum of the study site taking these life-forms.

Results and Discussion

Floristic Diversity

A total of 224 plant species, 216 angiosperms (184 dicotyledons and 32 monocotyledons) and 8 gymnosperms were growing in S.P. College, Srinagar (J & K) (Table 1). Total 57 dicot and 9 monocot families of angiosperms were present (Table 2), is slightly higher than the previous studies of natural grasslands of Uttarakhand (Joshi and Srivastava, 1988; Manhas, 2003) and Jammu and Kashmir (Ved, Shakermerg, 1998). The percentage contribution of dicots and monocots was 85.19 and 14.81%, respectively. This was almost same with all the above mentioned studies. The Gymnosperms constituted 3.57% of the total plants reported.

Table 1. List of plant species and their family, subdivision, life-form and uses. The abbreviations used in the table are D (dicotyledons), M (monocotyledons), G (gymnosperms), Ph (phanerophyte), Ch (chamaephyte), H (hemicryptophyte), Cr (cryptophyte), Th (therophyte), O (ornamental), and W (weed).

Botanical Name	Family	Division	Life-form	Nature/uses
<i>Acer negundo</i> Linn.	Aceraceae	D	Ph	O
<i>Aesculus indica</i> (Col. Ex Camb.) Hook.	Hippocastanaceae	D	Ph	O
<i>Ageratum conyzoides</i> Linn.	Asteraceae	D	Th	O
<i>Ailanthus altissima</i> (Miller) Swingle.	Simaroubaceae	D	Ph	O
<i>Althea rosea</i> (Linn.) Cav.	Malvaceae	D	Th	O
<i>Alyssum minimum</i> Willd.	Brassicaceae	D	Th	O
<i>Amaranthus cruentus</i>	Amaranthaceae	D	Th	O
<i>Amaranthus hybridus</i>	Amaranthaceae	D	Th	O
<i>Amaranthus</i> sp.	Amaranthaceae	D	Th	W

<i>Amaryllis</i> sp.	Amaryllidaceae	M	Cr	O
<i>Anagalis arvensis</i> Linn.	Primulaceae	D	Th	W
<i>Androsace</i> sp.	Saxifragaceae	D	Th	W
<i>Anemone</i> sp.	Ranunculaceae	D	Th	W
<i>Anthemis cotula</i> Linn.	Asteraceae	D	Th	W
<i>Antirrhinum major</i> Linn.	Scrophulariaceae	D	Th	O
<i>Arabidopsis thaliana</i> (Linn.) Heynh.	Brassicaceae	D	Th	W
<i>Araucaria</i> sp.	Araucariaceae	G	Ph	O
<i>Arctium lappa</i> Linn.	Asteraceae	D	Th	W
<i>Artemisia vulgaris</i> Linn.	Asteraceae	D	Th	W
<i>Asparagus officinalis</i> Linn.	Liliaceae	M	Cr	W
<i>Aster</i> sp.	Asteraceae	D	Th	O & W
<i>Belamcanda</i> sp.	Iridaceae	M	Cr	O
<i>Bellis perennis</i> Linn.	Asteraceae	D	Th	O & W
<i>Bergenia ciliate</i> (Haw.) Sternb.	Saxifragaceae	D	Th	O
<i>Bergenia cordifolia</i> Linn.	Saxifragaceae	D	Th	O
<i>Bidens biternata</i> (Lour.) Merr. & Scherff	Asteraceae	D	Th	W
<i>Biota orientalis</i> Endlicher	Cupressaceae	G	Ph	O
<i>Brachiaria eruciformis</i> (Sm.) Griseb.	Poaceae	M	H	W
<i>Brassica campestris</i> Linn.	Brassicaceae	D	Th	W
<i>Calendula officinalis</i>	Asteraceae	D	Th	O
<i>Callistemon lanceolatus</i> Linn.	Myrtaceae	D	Ph	O
<i>Campsis grandiflora</i>	Bignoniaceae	D	Ph	O
<i>Canna indica</i> Linn.	Cannaceae	M	Cr	O
<i>Cannabis sativa</i> Linn	Cannabinaceae	D	Th	W
<i>Capsella bursa-pestoris</i> Linn.	Brassicaceae	D	Th	W
<i>Cardamine hirsuta</i> Linn.	Brassicaceae	D	Th	W
<i>Carduus nutans</i> Linn.	Asteraceae	D	Th	W
<i>Carex</i> sp.	Cyperaceae	M	Th	W
<i>Carpesium</i> sp.	Asteraceae	D	Th	W
<i>Catalpa bignonias</i>	Bignoniaceae	D	Ph	O
<i>Cedrus deodara</i> (Roxb. ex. D.Don) G.Don	Pinaceae	G	Ph	O
<i>Celosia cristata</i>	Amaranthaceae	D	Th	O
<i>Centauria cyanus</i>	Asteraceae	D	Th	O
<i>Centauria moschata</i>	Asteraceae	D	Th	O
<i>Cercis siliquastrum</i> Linn.	Caesalpinaceae	D	Th	O
<i>Chaenomeles</i> sp.	Rosaceae	D	Ch	O
<i>Chenopodium album</i> Linn.	Chenopodiaceae	D	Th	W

<i>Chenopodium ambrosioides</i> Linn.	Chenopodiaceae	D	Th	W
<i>Cherianthus cheiri</i> Linn.	Brassicaceae	D	Th	O
<i>Chlorophytum</i> sp.	Poaceae	M	Th	O
<i>Chrysanthemum indicus</i> Linn.	Asteraceae	D	Th	O
<i>Clarkia elegans</i>	Onagraceae	D	Th	O
<i>Clematis grata</i> Wall.	Ranunculaceae	D	Th	O
<i>Clinopodium</i> sp.	Lamiaceae	D	Th	W
<i>Conium maculatum</i> Linn.	Apiaceae	D	Th	W
<i>Convolvulus arvensis</i> Linn.	Convolvulaceae	D	Th	W
<i>Coronopus didymus</i> (Linn.) Smith.	Brassicaceae	D	Th	W
<i>Crataegus songarica</i> C. Koch.	Rosaceae	D	Ph	O
<i>Crocosemia masonorum</i>	Iridaceae	M	Cr	O
<i>Crocus sativus</i> Linn.	Iridaceae	M	Cr	O
<i>Cupressus torulosa</i> D. Don	Cupressaceae	G	Ph	O
<i>Cycas</i> sp.	Cycadaceae	G	Ph	O
<i>Cynodon dactylon</i> (Linn.) Pers.	Poaceae	M	H	W
<i>Cyperus</i> sp.	Cyperaceae	M	Th	W
<i>Dahlia</i> sp.	Asteraceae	D	Th	O
<i>Datura stramonium</i> Linn.	Solanaceae	D	Th	W
<i>Delphinium</i> sp.	Ranunculaceae	D	Th	O
<i>Dianthus</i> sp.	Caryophyllaceae	D	Th	O
<i>Digitalis purpurea</i> Linn.	Scrophulariaceae	D	Th	O
<i>Dioscorea deltoidea</i> Wall ex Kunth	Dioscoreaceae	M	Cr	O
<i>Epilobium hirsutum</i> Linn.	Onagraceae	D	Th	W
<i>Erigeron canadensis</i> Linn.	Asteraceae	D	Th	W
<i>Eriobotria japonica</i>	Rosaceae	D	Ph	O
<i>Eshsholtzia californica</i>	Papaveraceae	D	Th	O
<i>Euonymus japonica</i>	Celastraceae	D	Ch	O
<i>Euonymus japonica</i> var. <i>variegata</i>	Celastraceae	D	Ch	O
<i>Euphorbia helioscopia</i> Sun Spurge	Euphorbiaceae	D	Th	W
<i>Euphorbia prolifera</i> Buch.-Ham. ex D. Don.	Euphorbiaceae	D	Th	W
<i>Ficus</i> sp.	Urticaceae	D	Ph	W
<i>Fragaria vesca</i> Linn.	Rosaceae	D	H	O
<i>Fritillaria imperialis</i>	Liliaceae	M	Cr	O
<i>Fumaria indica</i> Linn.	Fumariaceae	D	Th	W
<i>Funnia</i> sp.	Liliaceae	M	Cr	O
<i>Galinsoga parviflora</i> Cav.	Asteraceae	D	Th	W
<i>Geranium lambertii</i>	Geraniaceae	D	Th	W

<i>Ginkgo biloba</i> Linn.	Ginkgoaceae	G	Ph	O
<i>Gladiolus</i> sp.	Iridaceae	M	Cr	O
<i>Gleditsia triacanthus</i>	Papilionaceae	D	Ph	O
<i>Gomphrena globosa</i>	Amaranthaceae	D	Th	O
<i>Helianthus</i> sp.	Asteraceae	D	Th	O
<i>Helichrysum</i> sp.	Asteraceae	D	Th	O
<i>Hemerocallis fulva</i>	Liliaceae	M	Cr	O
<i>Hibiscus</i> sp.	Malvaceae	D	Th	O
<i>Hibiscus trionum</i> Linn.	Malvaceae	D	Th	W
<i>Hydrangea paniculata</i>	Hydrangeaceae	D	Ch	O
<i>Hypericum perforate</i>	Hypericaceae	D	Th	W
<i>Iberis amara</i>	Brassicaceae	D	Th	O
<i>Ipomoea purpurea</i> (Linn.) Roth.	Convolvulaceae	D	Th	W
<i>Iris ensata</i> Thunb.	Iridaceae	M	Cr	O
<i>Iris kashmiriana</i> Baker.	Iridaceae	M	Cr	O
<i>Jasminum humile</i>	Oleaceae	D	Ch	O
<i>Juniperus communis</i>	Cupressaceae	G	Ch	O
<i>Kniphofia aloides</i>	Liliaceae	M	Cr	O
<i>Lactuca</i> sp.	Asteraceae	D	Th	W
<i>Lagerstroemia indica</i> Linn.	Lythraceae	D	Ph	O
<i>Lamium album</i> Linn.	Lamiaceae	D	Th	W
<i>Lathyrus odoratus</i> Linn.	Papilionaceae	D	Th	O & W
<i>Laurus nobilis</i> Linn.	Lauraceae	D	Ph	O
<i>Linaria marcoceana</i>	Scrophulariaceae	D	Th	O
<i>Lonicera japonica</i>	Caprifoliaceae	D	Ch	O
<i>Lonicera ovata</i>	Caprifoliaceae	D	Ch	O
<i>Lunaria annua</i> Linn.	Brassicaceae	D	Th	O
<i>Magnolia grandiflora</i>	Magnoliaceae	D	Ph	O
<i>Magnolia solangiana</i>	Magnoliaceae	D	Ph	O
<i>Magnolia stellata</i>	Magnoliaceae	D	Ph	O
<i>Mahonia aquifolium</i>	Berberidaceae	D	Ch	O
<i>Malus pumila</i>	Rosaceae	D	Ph	O
<i>Malva sylvestris</i> Linn.	Malvaceae	D	Th	O
<i>Marrubium vulgare</i> Linn.	Lamiaceae	D	Th	W
<i>Mazus delevayi</i> Bonati	Scrophulariaceae	D	Th	W
<i>Medicago lupulina</i> Linn.	Papilionaceae	D	Th	W
<i>Melia azedarach</i> Linn.	Meliaceae	D	Ph	O
<i>Melilotus alba</i> Med. ex Desr.	Papilionaceae	D	Th	W

<i>Melilotus indica</i> Linn.	Papilionaceae	D	Th	W
<i>Morus alba</i> Linn.	Moraceae	D	Ph	O
<i>Morus nigra</i> Linn.	Moraceae	D	Ph	O
<i>Muscari botryoides</i> Mill.	Liliaceae	M	Cr	O & W
<i>Myosotis arvensis</i> (Linn.) Hill.	Boraginaceae	D	Th	O
<i>Myriactis nepalensis</i> Less.	Asteraceae	D	Th	W
<i>Myrtus communis</i>	Myrtaceae	D	Ph	O
<i>Narcissus poeticus</i> Linn.	Amaryllidaceae	M	Cr	O
<i>Narcissus pseudonorscissus</i> Linn.	Amaryllidaceae	M	Cr	O
<i>Nepeta cataria</i> Linn.	Lamiaceae	D	Th	W
<i>Nerine sarnienis</i>	Amaryllidaceae	M	Cr	O
<i>Nerium indicum</i> Mill.	Apocynaceae	D	Ch	O & W
<i>Ornithogalum umbellatum</i> Linn.	Liliaceae	M	Cr	O & W
<i>Oxalis corniculata</i> Linn.	Oxalidaceae	D	H	W
<i>Oxalis latifolia</i> Linn.	Oxalidaceae	D	Cr	W
<i>Paeonia officinale</i>	Ranunculaceae	D	Th	O
<i>Petunia hybrida</i>	Solanaceae	D	Th	O
<i>Phlox drummondii</i>	Polemoniaceae	D	Th	O
<i>Physalis</i> sp.	Solanaceae	D	Th	O & W
<i>Plantago major</i> Linn.	Plantaginaceae	D	Th	W
<i>Platanus orientalis</i> Linn.	Platanaceae	D	Ph	O
<i>Poa</i> sp.	Poaceae	M	Th	W
<i>Polygonum amplexicaule</i> Linn.	Polygonaceae	D	Th	W
<i>Polygonum aviculare</i> Linn.	Polygonaceae	D	Th	W
<i>Polygonum hydropiper</i> Linn.	Polygonaceae	D	Th	W
<i>Populus nigra</i>	Salicaceae	D	Ph	O
<i>Portulaca grandiflora</i>	Portulacaceae	D	Th	O & W
<i>Portulaca oleracea</i>	Portulacaceae	D	Th	W
<i>Potentilla kleiniana</i> Wigt. and Arm.	Rosaceae	D	H	W
<i>Primula</i> sp.	Primulaceae	D	Th	O
<i>Prunus amygdalus</i>	Rosaceae	D	Ch	O
<i>Prunus cerasifera</i> var. <i>pissardii</i>	Rosaceae	D	Ph	O
<i>Prunus</i> sp.	Rosaceae	D	Ph	O
<i>Punica granatum</i> Linn.	Myrtaceae	D	Ph	O
<i>Quercus</i> sp.	Fagaceae	D	Ph	O
<i>Ranunculus arvensis</i> Linn.	Ranunculaceae	D	Th	W
<i>Ranunculus muricatus</i> Linn.	Ranunculaceae	D	Th	W
<i>Ranunculus scleratus</i> Linn.	Ranunculaceae	D	Th	W

<i>Robinia pseudoacacia</i> Linn.	Papilionaceae	D	Ph	W
<i>Rorippa islandica</i> (Oeder) Borbas	Brassicaceae	D	Th	W
<i>Rosa banksiae</i> Br.	Rosaceae	D	Ph	O
<i>Rosa indica</i> Linn.	Rosaceae	D	Ch	O
<i>Rubia cordifolia</i> Linn.	Rubiaceae	D	Ph	W
<i>Rubus ellipticus</i>	Rosaceae	D	Ch	W
<i>Rudbeckia bicolor</i>	Asteraceae	D	Th	O
<i>Rumex nepalensis</i> Spreng.	Polygonaceae	D	Th	W
<i>Rumex patens</i> Linn.	Polygonaceae	D	Th	W
<i>Salix alba</i> Linn.	Salicaceae	D	Ph	O
<i>Salix babylonica</i>	Salicaceae	D	Ph	O
<i>Salix</i> sp.	Salicaceae	D	Ph	O
<i>Salvia moorcroftiana</i> Wall. ex Benth.	Lamiaceae	D	Th	O & W
<i>Salvia splendens</i> Linn.	Lamiaceae	D	Th	O
<i>Saponaria vaccaria</i> Linn.	Caryophyllaceae	D	Th	O & W
<i>Sedum spectabile</i>	Crassulaceae	D	Th	O
<i>Semipivirens</i> sp.	Crassulaceae	D	Ch	O
<i>Senecio vulgaris</i> Linn.	Asteraceae	D	Th	W
<i>Setaria glauca</i> (Linn.) P. Beauv.	Poaceae	M	Th	W
<i>Siegesbeckia orientalis</i> Linn.	Asteraceae	D	Th	W
<i>Silene</i> sp.	Caryophyllaceae	D	Th	O
<i>Sisymbrium alliaria</i> Scop.	Brassicaceae	D	Th	W
<i>Solanum nigrum</i> Linn.	Solanaceae	D	Th	W
<i>Sonchus asper</i> (Linn.) Hill.	Asteraceae	D	Th	W
<i>Spirea canescens</i> D. Don.	Rosaceae	D	Ch	O
<i>Spirea cantoniensis</i>	Rosaceae	D	Ch	O
<i>Stachys</i> sp.	Lamiaceae	D	Th	W
<i>Stellaria media</i> (Linn.) Cyr.	Caryophyllaceae	D	Th	W
<i>Tagetes</i> sp.	Asteraceae	D	Th	O
<i>Tamarix indica</i>	Tamaricaceae	D	Ch	O
<i>Taraxacum officinale</i> Wigg.	Asteraceae	D	Th	W
<i>Taxus</i> sp.	Taxaceae	G	Ph	O
<i>Trifolium pratense</i> Linn.	Papilionaceae	D	Th	W
<i>Trifolium repens</i> Linn.	Papilionaceae	D	Th	W
<i>Tropaeolum majus</i>	Tropaeolaceae	D	Th	O
<i>Urtica dioica</i> Linn.	Urticaceae	D	Th	W
<i>Verbascum thapsus</i> Linn.	Scrophulariaceae	D	Th	W
<i>Vernonia</i> sp.	Asteraceae	D	Th	W
<i>Veronica anagallis-aquatica</i> Linn.	Scrophulariaceae	D	Th	W
<i>Veronica arvensis</i> Linn.	Scrophulariaceae	D	Th	W

<i>Viburnum</i> sp.	Sambucaceae	D	Ph	O
<i>Vicia sativa</i> Linn.	Papilionaceae	D	Th	W
<i>Vinca major</i> Linn.	Apocynaceae	D	Th	O & W
<i>Viola odorata</i> Linn.	Violaceae	D	Cr	W
<i>Viola tricolor</i>	Violaceae	D	Cr	O
<i>Wisteria sinensis</i> Sims.	Papilionaceae	D	Ph	O
<i>Xanthium spinosum</i> Linn.	Asteraceae	D	Th	W
<i>Xanthium strumarium</i> Linn.	Asteraceae	D	Th	W
<i>Yucca aloifolia</i> Linn.	Agavaceae	M	Ph	O
<i>Zantedeschia aethiopica</i>	Araceae	M	Cr	O
<i>Zennia elegans</i>	Asteraceae	D	Th	O
<i>Zephyranthes candida</i>	Amoryllidaceae	M	Cr	O

Table 2: Comparison of the flora of S.P. College, Srinagar with other grasslands of India

Site (Reference)	Family		Genera		Species	
	Dicot	Monocot	Dicot	Monocot	Dicot	Monocot
Panwalikantha, Uttarakhand, (Joshi and Srivastava, 1988)	38	08	112	25	169	38
Har-ki-Doon, Uttarakhand, (Manhas, 2003)	50	08	149	32	256	45
Shakermerg, J&K, (Ved, 1998)	46	08	179	29	278	49
S.P. College, Srinagar, J&K, (Present study)	57	09	152	28	184	32

Asteraceae was the most dominant family (28 genera and 30 species), followed by Rosaceae (12 genera and 16 species), Brassicaceae (12 genera and 12 species) and Papilionaceae (8 genera and 10 species). Other important families were Ranunculaceae, Polygonaceae, Poaceae and Lamiaceae.

In the present study site, Poaceae is not among the top six families. This may be due to

dominance of *Cynodon dactylon* and time to time removal of other grasses, which are considered as weed in a College premises. The dominance of Papilionaceae shows that the soil of the college is nutrient poor, especially of nitrogen. *Amaranthus*, *Magnolia*, *Polygonum* and *Ranunculus* are the most dominant genera with 3 species each.

Table 3. Comparison of the first six large families of angiosperms in different grassland ecosystems of India.

Har-Ki-Doon, Uttaranchal (Manhas, 2003)	Shakermarg, J&K (Ved, 1998)	Kashmir, J&K (Dar et al., 2002)	S.P. College, Srinagar, J&K (Present study)
Asteraceae (27/51)	Asteraceae (17/35)	Asteraceae (260/72)	Asteraceae (28/30)
Rosaceae (6/13)	Rosaceae (9/24)	Poaceae (160/73)	Rosaceae (12/16)
Poaceae (14/15)	Ranunculaceae (10/22)	Brassicaceae (115/44)	Brassicaceae (12/12)
Ranunculaceae (7/21)	Polygonaceae (4/20)	Rosaceae (98/32)	Papilionaceae (8/10)
Apiaceae (8/15)	Apiaceae (9/16)	Lamiaceae (88/32)	Lamiaceae (6/7)
Lamiaceae (12/18)	Scrophulariaceae (5/16)	Papilionaceae (84/34)	Scrophulariaceae (6/7)

Ecological Characteristics

The biological spectrum (Fig., 1) shows that therophytes (59%) are the most common life-form followed by phenerophytes (19%) and cryptophytes (12%). Raunkiaer (1934) stated that moisture and heat conditions of the environment are of prime importance in determining the pattern of plant distribution in different zones of the earth. He further added that the unfavourable period of the year again plays an important role, and acts as limiting factor, because it exhibits pronounced effect than the favourable period. The domination of therophytes indicates the water stress conditions and grassland nature of the site. The high diversity of phenerophytes is because most of them are planted in the college.

The biological spectrum of present study when compared with Singh and Yadava (1974) and Tiwari and Gupta (1982) showed some similarities like the dominance of therophytes (Table 4) whereas no similarities were found with Raunkiaer’s normal spectrum (Fig., 1).

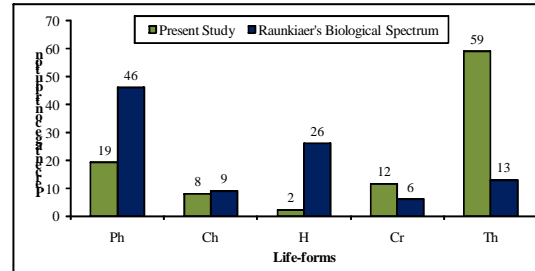


Figure 1. Comparison of biological spectrum of the present study with Raunkiaer’s normal spectrum. Ph (phanerophyte), Ch (chamaephyte), H (hemicytrophite), Cr (cryptophyte) and Th (therophyte).

Table 4: Comparison of biological spectra of other grasslands and present study site.

Spectrum	Percentage contribution of species among the life-forms					Reference
	Ph	Ch	H	Cr	Th	
Tropical natural grassland	2	10	19	6	63	Singh and Yadava (1974)
Submontane natural grassland	16	9	9	19	47	Tiwari and Gupta (1982)
Temperate grassland	20	8	2	11	59	Present study

Nature of the vegetation

Flowers are symbolic of beauty, love and tranquillity. They form the soul of a landscape and convey the message of nature of man. The flowers growing in botanical gardens serve another function of educating the students about various parts of the flower, pollination, seed dispersal etc.

We studied the nature of vegetation of the college under two classes viz. ornamental and weed. A total of 122 ornamental and 88 weeds were recorded from the site. In the Dictionary of Ecology weed is a general term for any troublesome or otherwise undesirable plant. But all the weeds are not unwanted. We found eleven plant species, which are treated as weeds in some ecosystems, are grown as ornamental in the college (Fig., 2). Some of the important ornamental plants planted in the college are *Araucaria* sp., *Biota orientalis*, *Callistemon lanceolatus*, *Crocus sativus*, *Cycas* sp., *Digitalis purpurea*, *Ginkgo biloba*, *Gleditsia*

triacanthus, *Juniperus communis*, *Magnolia solangiana*, *Magnolia stellata*, *Nerium indicum*, *Tamarix indica*, *Taxus* sp., *Wisteria sinensis*, *Yucca aloifolia* etc.

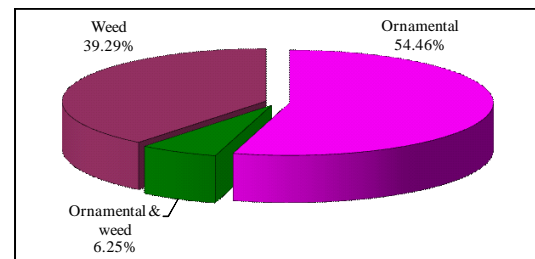


Figure 2. Distribution of plant species.

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