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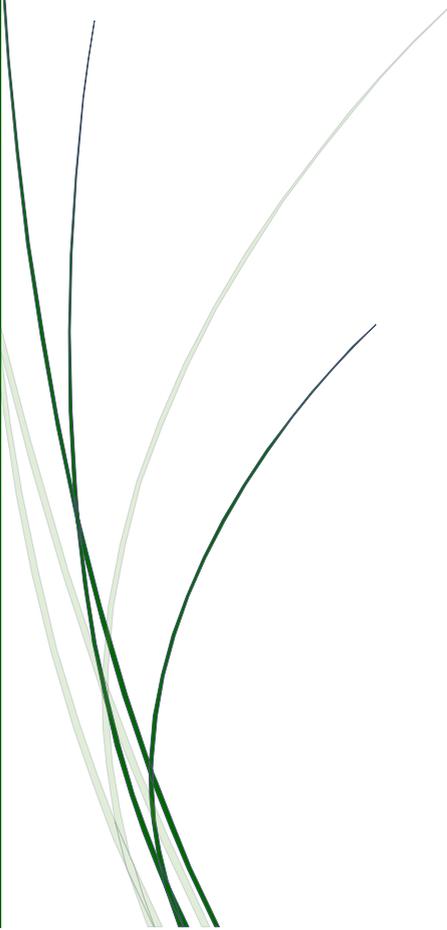
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 C A R A S

# Phytosociological Attributes of Herbaceous Diversity at Different Habitats of Srinagar

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## ABSTRACT

The investigation was conducted to investigate the phytosociological attributes of herbaceous vegetation during summer (June-August) and autumn (September- November) seasons at three different sites in S. P. College (protected), Theed Dhara (moderately protected) and Dachigam out skirt (degraded). Phytosociological attributes of plant species were studied by randomly laying 25 quadrats of 1 × 1 m<sup>2</sup> size at three selected sites. Diversity index and Richness index showed higher trend (1.798-2.22), (1.957-2.660) at Site I (protected) during both seasons. Dominance index was observed highest (1.305-0.984) at Site III (degraded). Evenness index showed a maximum variation of (0.941-0.709) during summer and autumn seasons at Site III (degraded). The highest dominant species based on Importance Value Index (IVI) recorded at different Sites was *Cynodon dactylon*. The ratio Abundance to Frequency (A/F) was carried to interpret the distribution pattern of the species in terms of regular (< 0.025), random (0.025-0.05) and contagious (> 0.05) distribution. The results indicated contagious pattern of distribution followed by random. However regular distribution pattern was almost negligible

**Key words:** Phytosociological, Herbaceous, Diversity, Habitats, Srinagar

Biodiversity is way of describing the diversity of life on earth; it includes all life forms and the ecosystem of which they are part. It forms the foundation for sustainable development, constitutes the basis for the environmental health of our land and is the source of economic and ecological security for our future generations. In the developing countries, biodiversity provides the assurance of food, many raw materials such as fiber for clothing, materials for shelter, fertilizer, fuel and medicines, as well as source of work energy in the form of animal traction. In addition, biodiversity maintains balance for planetary and human survival [1]. The current contraction of biodiversity is cause for alarm, while disappearance is most serious. Biodiversity is continuously declining due to the activities of human kind.

Biodiversity is essential for human survival and economic well being, and for the ecosystem function and stability. In India habitat destruction, over exploitation, pollution and species introduction are identified as major cause biodiversity loss.

Losses of biological diversity are being driven, primarily by human population growth and by unsustainable patterns of resource consumption, reinforced by inappropriate economic structures and activities that maximize short-term gain, without considering long-term consequences [2].

The Himalayan region is known for its rich biological diversity and has always been a botanist's paradise. It's diversified main forms; land relief and environmental conditions support an array of forest types. Vegetation within a forest area is greatly affected by the difference in the micro climate, slope and the altitude). The selection pressure originating due to the differences in the micro-climate and the inter-specific competition influences the regeneration of the different species and also opens the door for the invasion and acclimatization of new species in a forest ecosystem.

Floristic dynamics of landscape reflects variation in the climatic condition's habitat and physiography of the region. The study of the natural biotic community is a pre-requisite to understand the structural as well as functional attributes to locate for better landscape management. The Himalayan ecosystems with their high biological diversity and rich genetic resources are very fragile, sensitive to environmental degradation and continued human interferences. Thus, the conservation of the Himalayan biodiversity is need of today and forest species are the major part of the resources, need to be managed and conserved. There is broad scientific consensus that without and adequate response to the resulting pressures on natural ecosystem – loss, fragmentation and degradation of habitats,

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overexploitation of wild species, the introduction of non-native alien species, and climate change – biological diversity will continue to be lost at a rate that is unprecedented since the appearance of modern kinds of ecosystems more than 40 million years ago [3-6]. Action is needed now, and if conservation strategies and policies wait for perfect knowledge many species will be lost. These disturbances have been considered important factors structuring communities. The anthropogenic disturbances greatly affect the biodiversity and structural characteristics of community.

Phytosociological analysis of a plant community is an essential prerequisite for the study of vegetation which includes its floristic composition structure, development and distribution either through a quantitative analysis of the plants or the environmental factors. The present study was confined to herbaceous plant species of different habitats of the Srinagar in order to know the various parameters of diversity in those habitats and also to compare them with different months and sites

## MATERIALS AND METHODS

### *S. P. College*

This site is located in vicinity of Lal Chowk Srinagar Kashmir with an altitude of about 1576M lying within geographical co-ordinates of 34°5' to 34°6' N latitude and 74°8' to 74° E longitude. The area is fenced completely and has been protected from any disturbance for the last few years. The site is a sunny, open place. The site is well drained and flat.

### *Theed Dhara*

This site is located 23 kms away from Srinagar city within geographical co-ordinates of 34° 10' 1" N and 74°54' 33" E. Human habitations are close to the site and it is under pressure from anthropogenic as well as livestock grazing. Micro climate and topographic features make the site favorable for the growth of plants especially medicinal plants.

### *Dachigam Out Skirts*

This site is located near Dachigam National Park. This area is situated 18 Kms north east of Srinagar. This area lies at an altitudinal range of 1,700 to > 4,000m. At the base of this area lies the Harwan Reservoir and Theed village (1,700-1800m). The area in which study was undertaken is a sunny open place and is found to be highly degraded due to grazing pressures and human interferences.

### *Vegetation analysis*

To study the community composition and other phytosociological characters of the herbaceous vegetation at three selected sites, systematic field surveys were conducted from June to November. Phytosociological attributes of plant species were studied by randomly laying quadrats of

1×1 m<sup>2</sup> size at each of the three sites. Specimens of each plant species were collected per site and were identified at Environmental Division SP College Srinagar Kashmir.

### *Data analysis*

The vegetational data was quantitatively analyzed for density, frequency, abundance, relative frequency, relative density, and relative abundance according to the methodology described by [7]. Relative values of these parameters were summed up to get Importance Value Index (IVI) [8]. The diversity index (H') was computed by using Shannon-Wiener index [9]. The ratio abundance to frequency (A/F) was carried to interpret the distribution pattern of the species. This ratio has indicated regular (<0.025), random (0.025 to 0.05) and contagious distribution (>0.05) [8]. Concentration of dominance was calculated following the formula given by Simpson [10]. Evenness index was computed according to Pielou [11] whereas species richness was calculated according to Margalef [12]. Similarity index (S) between two communities was derived from the formula given by Sorensen [13].

## RESULTS AND DISCUSSION

### *Vegetation attributes*

During the study period total number of herbaceous species reported during prominent seasons were 12 at site I (protected), 7 at site II (moderately degraded) and 4 at site III (degraded). The Diversity index during both seasons at Site I showed a variation of (1.798-2.22) followed by (1.184-1.417) at Site II and (1.305-0.984) at Site III respectively (Fig 1).

Species richness revealed slightly higher values for Site I (average =2.235) compared to Site II (average =1.0415) and Site III (average=0.864). This attribute increasing disturbances at Site II and Site III on account of grazing, direct exploitation of plants, agricultural encroachments and other disturbances. Highest Importance Value Index during the study period was obtained by *Cynodon dactylon* (83.2), (126.12), (116) in months of November, September, and September at Site I, Site II and Site III respectively. However lowest Importance Value Index were recorded by *Poa annua*, *Polygonum spp.* (4.1) in September at Site I, by *Epilobium spp* (10.35) in month of June at Site II, by *Cynodon dactylon* 15.15 in month of November at Site III [14].

Many important medicinal plants like *Taraxacum officinale*, *Ranunculus spp.*, *Urtica dioica*, *Mentha Spp.* were reported less diverse due to manmade activities like grazing pressures, illegal forest harvesting, deforestation and different developmental activities etc.

The Phytosociological analysis of herbaceous vegetation shows that *Cynodon dactylon* is the most dominant species at protected as well as moderately degraded and degraded sites. These results are in comparison with the Kuniyar forest of Himachal Pradesh where *Cynodon dactylon* was one of the most dominant species [15].

Table 1 Shannon index of various species at Site I, Site II and Site III from June to November

S. No.	Sites	June	July	August	September	October	November
1.	Site I	1.798	1.964	2.069	1.902	1.976	2.22
2.	Site II	1.184	1.445	1.417	1.383	1.398	1.417
3.	Site III	1.305	1.272	1.257	1.183	1.181	0.984

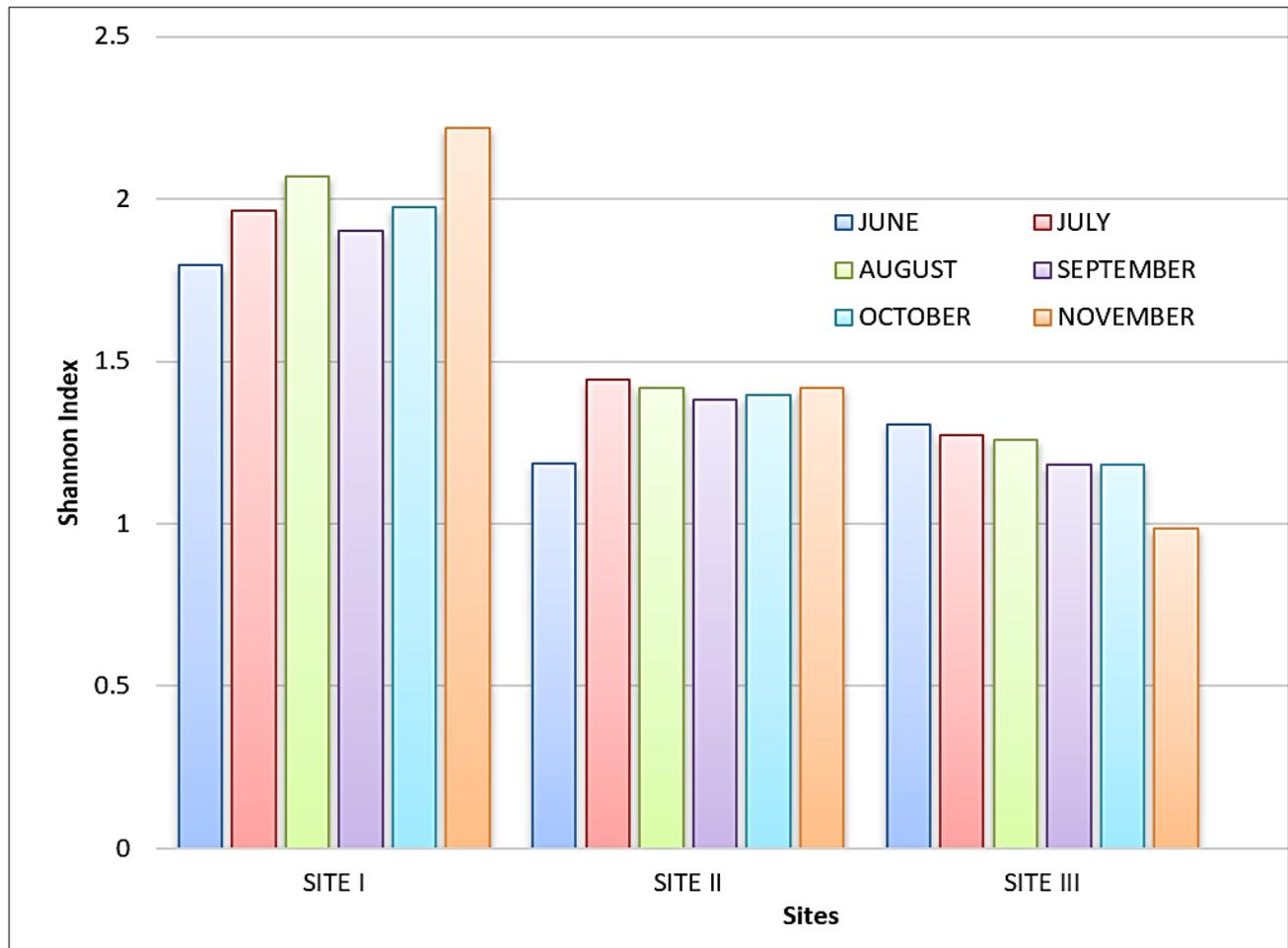


Fig 1 Shannon index of various species recorded at Site I, Site II and Site from June to November

Important Value Index (IVI) of species indicate the richness of species in an community. Higher IVI indicates the high ecological abundance and it is a reflection of better generation status of species [16]. Species showing maximum Importance Value Index was *Cynodon dactylon* at all the three selected sites. It can thus be concluded that *Cynodon dactylon* is highly diverse species in the study areas having high ecological abundance and better regeneration status of species. These findings are in agreement with the findings of [17] underground flora of pines in the forest of Amarkantak.

#### Distribution pattern

The distribution pattern indicated that in most of the sites species were distributed contagiously followed by random at the selected sites. Odum [18] described that in natural conditions contagious distribution is most common type of distribution and is formed due to small but significant variations in ambient environmental conditions and occurs due to severe competition between individuals. Regular distribution is most likely to occur where there is high density of individuals within uniform area. Finally overall results revealed that changing climatic conditions from warm to cold have more influence on sites, individual plants species as well the protected sites recorded maximum diversity in comparison to highly degraded site, hence recommended protection of the degraded sites. Disturbance may not be allowed to that of higher level rather than it should be of moderate type which can enhance species diversity as is being

well studied [19-20].

## CONCLUSION

The present study indicates that Site-II and Site-III were moderately and completely degraded. Thus, diversity was found to be less at these sites. Amongst major factors that influenced vegetation structure of site II and site III are grazing pressures, over harvesting, loss of knowledge etc. Grazing pressure are not only brought about reduction in the plant density and vegetation cover, but also caused a significant change in plant growth pattern. The steadily increasing of population in such areas has led to extensive clearing of vegetation that in turn has led to degradation of such areas. Political uninterest, often in the form of insurgencies, also has been responsible for degradation of these areas. However, Site-I (S.P. College) was found to be most diverse because it is very less disturbed by human activities and grazing pressures as compared to Site-II and Site-III as it is being protected highly. Thus, it may be said that protected site reserved maximum diversity in comparison to degraded sites. It is further suggested that species with lower IVI need priority measures for protection and those with higher IVI need monitoring effort in order to maintain diversity in the selected sites during different seasons. Variation in quantitative parameters like, species richness and species diversity are related to variations in edaphic factors, elevation, slope aspect and micro-climatic conditions in between the three selected sites.

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