A Comparative Account Of Tree Diversity By Phytosociological Method In Badshahithaul Forest Of Chamba Block Of Tehri Garhwal, Uttarakhand

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Abstract

Phytosociological characteristics and diversity of different species of forest and index of similarity between forests of different areas of Badshahithaul forest of Chamba block of district Tehri Garhwal were done in thee different sites. A total of 08 major tree species were found in all three study areas. The common species in all three study zones are Quercus leucotrichophora , Rhododendron arboreum and Pinus roxburghii..

Phytosociological characters differ among different forest localities and among trees in the same forest. The dominant species in the forest of Badshahithual (North facing slope) is Quercus leucotrichophora (185.5), in North-East facing slope the most dominant species is Quercus leucotrichophora (115.59) while in East facing slope Pinus roxburghii (248.24)is most dominant species

Introduction

The study of the structure of vegetation and its systematics is vegetation ecology. It includes the investigation of species composition and the sociological interaction of species in communities (Muller-Dombois and Ellenberg,1974). It also includes composition, development, geographic distribution and environmental relationship of plant communities; plants growing together have a mutual relationship among themselves and with the environment. Interaction among different plants and between plants and their environment is outcome of different vegetation types in different areas.

Phyto-sociology is the Quantitative study of vegetation or the special field of study of plant communities with respect to their components structure and classification forms the basis of the division of ecology. The mixed forest had the greatest tree diversity and among the other diversity increased with increasing shrub plus seedling and tree plus sapling in *Pinus roxburghii* and mixed forest.

Material and Methods

The Uttarakhand Himalaya comes in the central Himalayan region. Uttarakhand state lies between latitudes 28^0 43' to $31^0$27' N and longitudes 77^0 34' to 81^0 02' E extending from river tons in the west to river Kali in the East. Tehri Garhwal district is bounded by Uttarkashi from the North side, Pauri Garhwal from the South-Side, Rudraprayag from the East-Side and Dehradun from the west side. It covers the 3642 km^2 area of the state. The present study was conducted between the years 2017 to 2019 in all prominent seasons *viz.* summer, rainy and autumn.

The study area is situated in Chamba block at Badshahithaul forest of district Tehri Garhwal. A total of eight (8) species of Tree occurred in all three study areas. Three sites of the study are as follows1: NORTH SITE 2: NORTH-EAST SITE 3: EAST SITE

The study area of Badshahithaul forest deals with some **Vegetation analysis, diversity, Concentration of dominance and index of similarity**. A number of indices have been devised to express species diversity which is the most commonly used index of general diversity in order to compare two communities.

The forest areas have been studied by the Quadrate method (Curtis and McIntosh, 1950) after listing the trees on one slope. The Number of Species for each slope is enumerated as the species richness (Whittaker 1960). The species was identified with the help of regional flora, the Flora of district Garhwal (Gaur, 1999). The size of the quadrate taken was 10×10 sq meter for trees (Misra1968). Formulas used for different quantitative characters are as follows:

Importance Value Index (IVI) = Relative Frequency + Relative Density + Relative Dominance

Diversity and Concentration of Dominance

The index of dominance or the concentration of dominance (Cd) is calculated by using the Simpsons (1944) index as:

Index of Dominance (Cd) = " $(ni/N)^2$

The index of diversity (H) was computed by using Shannon and Wiener's information index (Shannon and Wiener 1963).

Diversity Index (H) = -" [(ni/N) log (ni/N)]

Where,

ni = Importance value of each species (such as number of individuals).

N = Total importance value of all species (Total number of individuals).

Index of Similarity

The Index of Similarity (S) is calculated to compare the forest of two elevations (Whittaker 1967) as:

Index of Similarity (S) = 2C/A+B

Where,

C = Number of common species occurring in both communities

A = Number of species in forest A

B = Number of species in forest B

Result and Discussion

Different tree species were identified from different slopes of the forest. The common tree species in all three sites are *Pinus roxburghii, Quercus leucotrichophora, and Rhododendron arboretum*. On the basis of the Important Value Index (IVI), the main dominant species is *Quercus leucotrichophora* in the Badshahithaul forest (North site) whereas (North-East) facing slopes forest is mainly dominated by *Pinus roxburghii* and *Quercus leucotrichophora,* making it mixed type of forest. The East –the site is dominated by *Pinus roxburghii*.

The diversity value for these forests ranged between 0.28 to 0.68. The maximum value of the diversity Index was recorded for Badshahithaul forest East facing slope (0.6804). The concentration of dominance is comparatively high East Site of Badshahithaul Forest (0.7005). The Index of similarity observed for different Forests ranges between (0.76) to (0.75).

On the basis of the IVI chart, it is clearly observed that *Quercus leucotrichophora* is dominant on the North side of the Badshshithaul forest. North-East Site was also dominated by *Quercus leucotrichophora* and the East site was dominated by *Pinus roxburghii.*

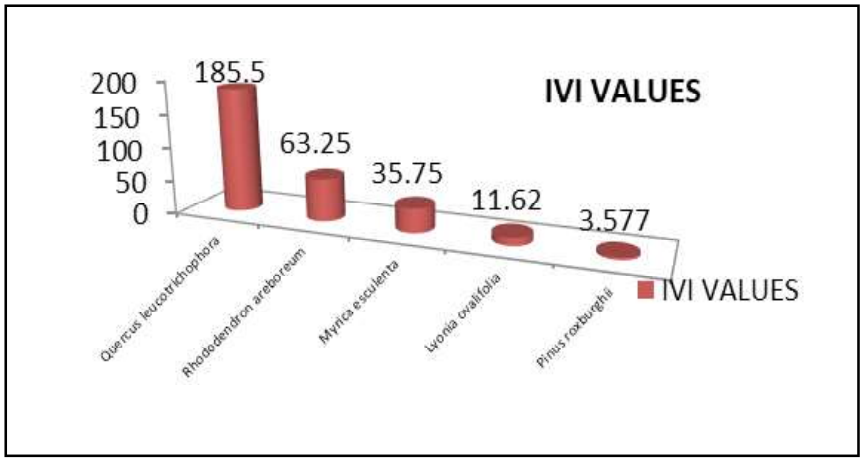


Fig.1: Relative IVI Values of Tree Species at Badshshithaul Area (North Site)

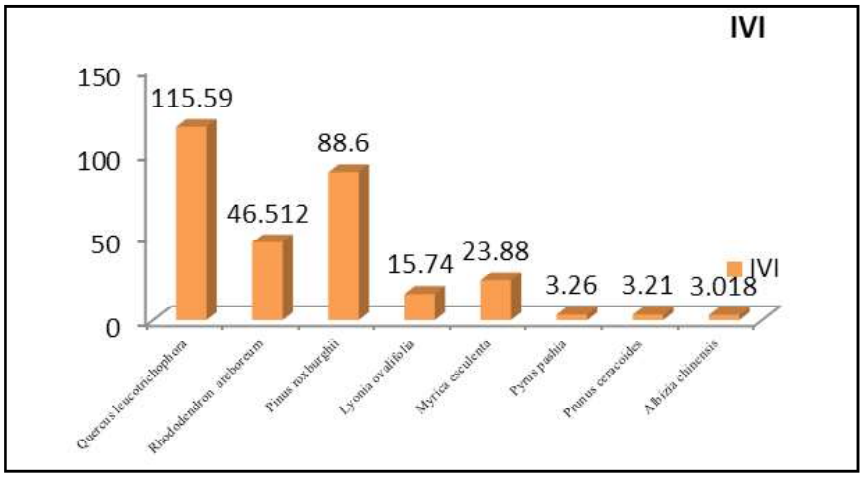


Fig.2: Relative IVI Values of Tree Species at Badshahithaul Area (North-East Site)

North-East Site had maximum number of tree species (8) with the highest Importance Value and also shows the maximum value of the concentration of dominance. East Site shows maximum diversity Index. The North-East site shows a low-value concentration of dominance and also a low value of diversity Index than the North side and East Sites.

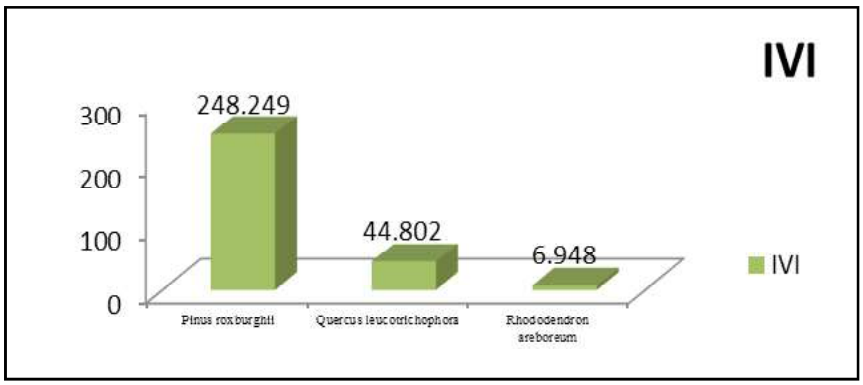
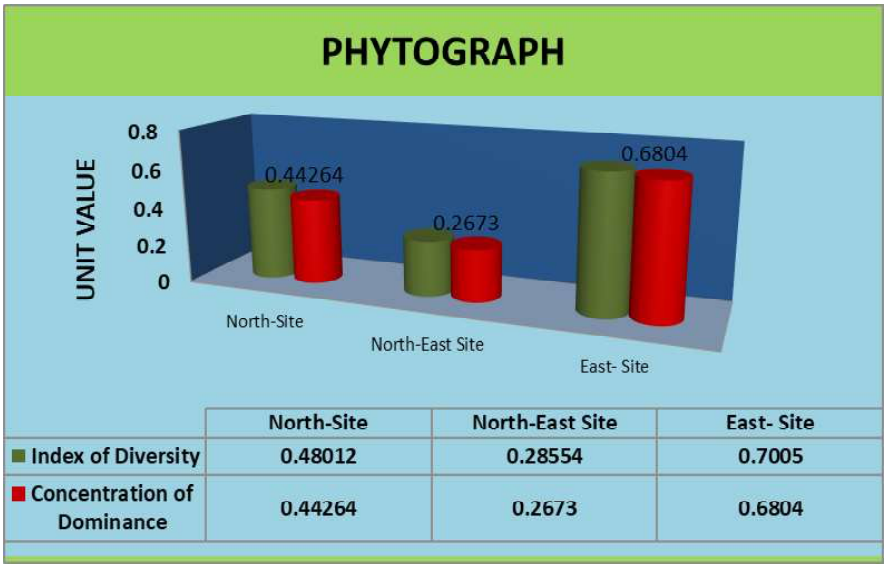


Fig. 3: Relative IVI Values of Tree Species Badshshithaul Area (East- Site).



	North-Site	North-East Site	East- Site
Index of Diversity	0.48012	0.28554	0.7005
Concentration of Dominance	0.44264	0.2673	0.6804

Fig 4 : Graphical Presentation of Index of Diversity and Concentration of Dominance on Different Sites of Badshahithaul Forest.

Conclusion

The presence of higher diversity of *Quercus leucotrichophora*, *Rhododendron arboretum, and Pinus roxburghii* showed the open type forest canopy on hill slope which showed.

Highly disturbed forest due to the colonization of villages near forest. A strong correlation was observed between tree felling and population density, fuelwood consumption

as well as ease of access in the area. The forest sites surrounded by larger villages and having easy road access represented lower tree species values

Hilltop showed fairly undisturbed type of forest while hill slope was the highly disturbed one. The high intensity of anthropological disturbance regularly disturbs the natural balance and alpine vegetation communities, thus preventing them to reach the climax stage of community maturity.

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