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Shinny Ann Nickels
M.Sc. Scholar, Department of
Environmental Sciences and
Natural Resources Management,
SHUATS, Allahabad, Uttar
Pradesh, India

Harsh Bodh Paliwal
Assistant Professor, Department
of Environmental Sciences and
Natural Resources Management,
SHUATS, Allahabad, Uttar
Pradesh, India

Assessment of tree diversity of Urban and rural area at Jaunpur district, Uttar Pradesh

Shinny Ann Nickels and Harsh Bodh Paliwal

Abstract

The present work aimed to study the stand parameters (Crown size, basal area, frequency, density, dominance, IVI, species diversity and richness) were calculated on the tree species diversity at urban and rural area of Jaunpur, district, U.P. A total number of 3911 trees representing 54 species of trees and 23 families of the species were identified. Species were classified into diverse classes according to their occurrence. The importance value index (IVI) for each species was determined. The Shannon diversity index values obtained in an urban area are lower than those obtained in a rural area. In the Rural area, *Mangifera indica* has the highest IVI with 196.15 and lowest was of *Pongamia pinata* with 56.81. In an urban area, high IVI was of *Azadirachta indica* with 176.69 and *Cassia fistula* was lowest IVI with 72.22. From these studies it is evident that rural area sites was having an edge cover and was highly dominant and urban area sites in terms of species diversity, dominance and richness was less dominant.

Keywords: species diversity, species richness, shannon diversity index, tree composition important index value

Introduction

Trees play a very important role in our surroundings. As pollution and cutting of trees increases day by day, the ecological balance should be maintained (Singh, 2015) [7]. Species diversity is an important concept and one of the major attributes of a natural community. Floristic inventory and diversity studies help us to understand the species composition and diversity status of forests and offer vital information for forest conservation (Gordon and Newton, 2006) [2]. Tree diversity can be measured in lots of different ways the most commonly used measure is that of species richness, there are a number of reasons for this it is often easier to count the number of species compared to other measures of biodiversity. Humans can visualize variation in biodiversity as variation in species richness (Purvis & Hector, 2000) [6]. Environmental factors influence the growth and development of living for a tree is any plant that has a woody stem of at least 8 to 10 feet in height, with crown of branches and a leaf at the top. The importance of trees in providing environmental protection and renewable energy supplies is well known (Purohit and Dhar, 1997) [5].

Study area

Jaunpur is situated to the northwest of the district of Varanasi which lies eastern part of the north Indian state of Uttar Pradesh. The geography of the district is primarily a flat plain with the narrow river- balleys. Gomati & Sai are its foremost perennial rivers. Jaunpur district is having a environment dependable with that of the Northern Plain a central highlands including the Aravali range, hot semi-arid eco-region 4.3 and hot dry eco-region 9.2. District lies at a global location of 82.69° East longitude and 25.74° North latitude. Jaunpur falls under the Varanasi division of U.P. Its covers a total area of 4,038 sq.km. Jaunpur city is situated at the bank of Gomati River. Its altitude varies from 261 ft. to 290 ft. above msl (Mean sea level). The economic developments of the district depend on agriculture.

Correspondence

Shinny Ann Nickels
M.Sc. Scholar, Department of
Environmental Sciences and
Natural Resources Management,
SHUATS, Allahabad, Uttar
Pradesh, India



Fig 1: Location of urban and rural areas at Jaunpur, district, U.P

Materials and Methods

The study was carried out within 20 sites of urban and rural areas under Jaunpur district from January 2017 to June 2017 to assess the tree diversity and species richness of the given area. The vegetation analysis of the selected area was carried out by using the quadrates of 10 X 10 m² were laid in random and systematic selection (Grieg – Smith, 1964) by using standard quadrant method (Srivastava, 2001). Ten sites each were taken in both areas (urban and rural sites).

The numbers of tree species found in the different quadrants were identified. The vegetation was quantitatively analyzed for frequency, density, dominance; Basal area, relative basal area and important value index of recorded species were calculated. It thus integrates three important parameters that measure the output and variety of every species therefore relative frequency, relative density, and relative dominance. The commonly used biodiversity index is Shannon- Wiener index and that of dominance index is Simpson's index were calculated for both urban and rural sites by standard method.

Results and Discussion

Tree species composition and distribution

The diversity and vegetation composition recorded in (10×10) m². Each quadrant with (10×10) m² was laid down randomly viz. North-West, North-East, and South-East and South-West direction from the center respectively. Numerous field trips of period ranging 2-3 days were made at consistent interval to several areas at Jaunpur. In each quadrant, the name and number of each tree species were assigned to families and relative diversity (no. of species in a family) was obtained for tree species diversity classification.

Diversity analyses

The study was done to assess the tree diversity and species richness of the urban and rural areas. A total of 3911 trees representing 54 species and 23 families were identified from the total area. Fabaceae was the most dominant family in terms of number of trees at both urban and rural area with 11

species followed by Anacardiaceae with 1 tree species and Moraceae with 7 tree species. The findings have been illustrated with the help of tables and graphs where ever felt essential to clarify the results. Each sampled trees was evaluated in the field in terms of species, species identification was done on the basis of local and regional flora. All trees > 10 cm girth at breast height (gbh; 1.37m from the ground) were measured. All recorded trees were identified to species level in the field with the help of regional floras (Gamble and Fisher, 1915-1935; Mayuranathan, 1929) [1, 4].

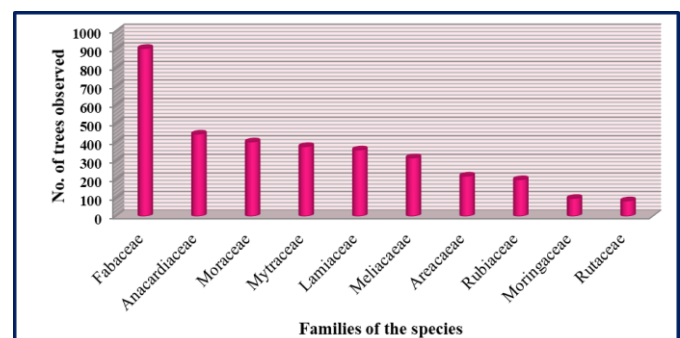


Fig 2: The most common families recorded at each site

Comparison between species diversity and richness at rural and urban area

Richness and diversity of tree species were recorded in each site by using Shannon diversity and Simpson's index. The Shannon diversity index is usually used to describe species diversity in a community. The extreme species diversity in a rural area was found at site-19 (Nayiganj), site-7 (sikrara), site-5 (Pasewa), site-10 (Jafrabad), site-8 (Kabulpur), site-1 (Khanpur), site-9 (Sirkoni), site-20 (Machlishehar). Species richness (per m²) varied from 0.050 to 0.1240 and diversity value varied from 0.4020 to 3.159. The findings have been included all experimental sites of the rural and urban area presented in table 1 and 2 and fig-1.1, 1.2 and 2.1, 2.2.

Table 1: Species diversity and richness of experimental site in therural area

S. No	Rural area	Simpson’s index (D)	Shannon Diversity index(H)
1	Khanpur	0.077	2.809
2	Siddiqpur	0.1	2.476
3	Qutubpur	0.1011	2.405
4	Jasopur	0.107	2.551
5	Pasewa	0.063	3.01
6	Kerakat	0.08	2.57
7	Sikrara	0.0613	2.99
8	Kabulpur	0.06	2.95
9	Sirkoni	0.071	2.844
10	Jafrabad	0.061	2.988

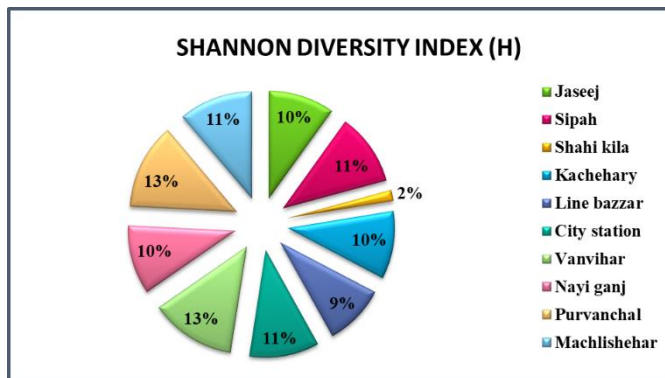


Fig 5: Shannon diversity index value of all experimental site under urban area

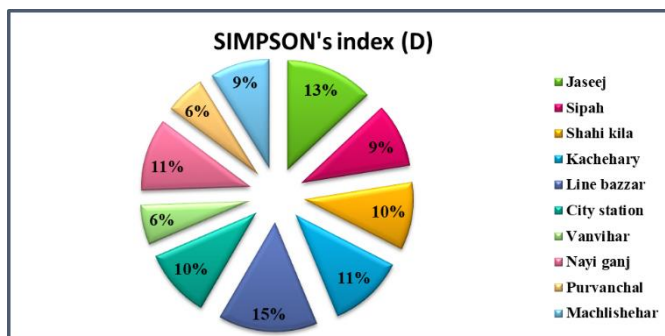


Fig 6: Simpson’s index value of all experimental sites under urban area

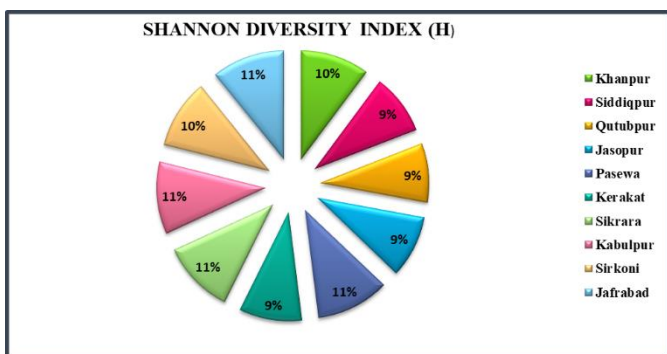


Fig 3: Shannon index value of all experimental sites under rural area

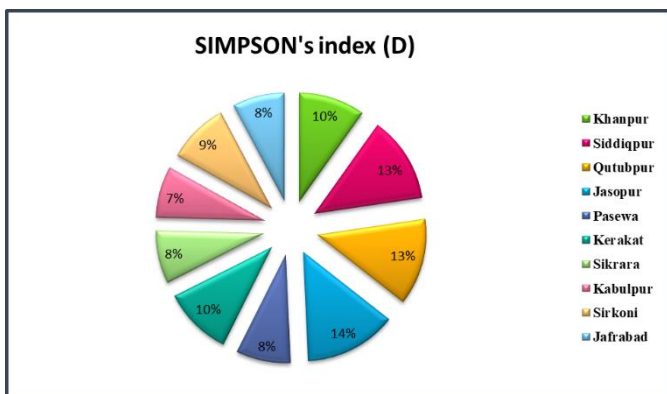


Fig 4: Simpson’s index value of all experimental sites under rural area

Table 2: Species diversity and richness of experimental site under urban area

S. No	Urban Area	Simpson's Index (D)	Shannon Diversity Index (H)
1	Jaseej	0.11	2.4
2	Sipah	0.08	2.64
3	Shahikila	0.085	0.402
4	Kachehary	0.095	2.48
5	Line bazaar	0.124	2.24
6	City station	0.086	2.56
7	Vanvihar	0.05	3.138
8	Nayiganj	0.091	2.52
9	Purvanchal	0.05	3.159
10	Machlishehar	0.075	2.714

Conclusion

According to the study high richness and diversity of trees species were found in rural area. Rural area was comparatively higher than urban area as in terms of vegetation cover, it contains more green places, proper vegetation which is one of the most important evaluations of the studies to be considered for the maintenance of environmental health. The study provides basic information about the woody plant as it provides us with the data to explore and describe biodiversity through scientific analysis. The Shannon diversity index was used as a measure of species abundance and richness to count diversity of the woody species in the experimental area. The Shannon diversity index of rural area is more than those of urban area. The results and investigation of the study can be useful to policy planner and the areas to deliver invaluable ecosystem services such as pollution abatement and carbon sequestration etc. to its environment and manage habitat as well as cultural resources values of the study area.

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