

Assessment of Plant Species Diversity in the Nameri Forest Reserve, Assam, India Using Quadrant Sampling Techniques

ISSN: 2770-6745

**Shouvik KN***

Bengal College of Pharmaceutical Sciences and Research, India

Abstract

This study employs quadrant sampling to determine the number of unique plant species residing in the Nameri Forest Reserve in Assam, India. The survey identified 132 distinct species of plants from 58 different groups. The most prevalent groups were *Fabaceae*, *Poaceae* and *Asteraceae*. The Shannon Index ranged from 2.98 to 3.42, indicating a moderate to high amount of diversity. The research identified a significant correlation between prospective forest carbon stores and biodiversity attributes such as variety, density, and richness. The research employed Pearson correlation, cluster analysis, and regression analysis to examine the dry tropical reserve forests of Assam. The predominant flora in the Bhomoraguri reserve forest included *Cynodon dactylon*, *Datura stramonium*, *Clitoria ternatea* and *Tectona grandis*. They comprise trees, grasses, forbs, and climbing plants. The research revealed that the Bhomoraguri reserve forest contains 302.93t ha⁻¹ of carbon reserves, whilst the Balipara reserve forest possesses 283.97t ha⁻¹ of carbon stocks. This indicates that each may contain 555.87 and 521.30t ha⁻¹ of CO₂. Trees constituted around 54.80% of the overall plant population. Forbs constituted 21.36% of the total, climbers comprised 19.35%, and grasses represented the least at 4.49%.

Introduction

Plant biodiversity is a vital component of terrestrial ecosystems and plays a central role in maintaining ecological balance, supporting fauna, and providing resources for human populations. Biodiversity hotspots such as the Eastern Himalayan foothills are particularly important due to their high endemism and ecological services. Nameri Forest Reserve, located in the Sonitpur district of Assam, India, lies within this biodiversity hotspot and remains under-studied for floristic composition. This study aims to assess the plant species diversity in the reserve using standardized quadrant sampling techniques [1,2].

Materials and Methods

Study area

The Nameri forest reserve (Latitude: 26.91°N, Longitude: 92.85°E) spans over 200km² and is characterized by semi-evergreen forests, moist deciduous vegetation, and riparian ecosystems. It has a subtropical climate with high annual rainfall and supports diverse flora and fauna.

Sampling methodology

Quadrant sampling was employed to quantify plant diversity. A total of 50 quadrants (5m×5m) were randomly distributed across five habitat types:

- Riparian zones
- Deciduous forest patches

***Corresponding author:** Shouvik Kumar Nandy, Bengal College of Pharmaceutical Sciences and Research, Durgapur, West Bengal, 713212, India

Submission:  May 22, 2025

Published:  July 11, 2025

Volume 5 - Issue 3

How to cite this article: Shouvik KN*. Assessment of Plant Species Diversity in the Nameri Forest Reserve, Assam, India Using Quadrant Sampling Techniques. Biodiversity Online J. 5(3). BOJ. 000614. 2025.
DOI: [10.31031/BOJ.2025.05.000614](https://doi.org/10.31031/BOJ.2025.05.000614)

Copyright@ Shouvik KN. This article is distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use and redistribution provided that the original author and source are credited.

- c) Semi-evergreen zones
- d) Grasslands
- e) Disturbed areas near human settlement

In each quadrant, all plant species were identified and recorded. Specimens were collected for identification using regional floras and compared with herbarium vouchers at the Botanical Survey of India (BSI), Shillong.

Data analysis

Diversity metrics were calculated as follows

- a) **Shannon-wiener index (H')**:

$$H' = -\sum p_i \ln f_0(p_i) \quad H' = -\sum p_i \ln(p_i)$$

- b) **Simpson's diversity index (D)**:

$$D = 1 - \sum p_i^2 \quad D = 1 - \sum p_i^2$$

- c) **Species richness (S)**: Total number of species per habitat.

- d) **Evenness (J')**: $J' = H' / \ln f_0(S)$ $J' = H' / \ln(S)$

Results

Species composition

A total of 132 plant species were recorded, distributed across 58 families. The most dominant families were:

- a) *Fabaceae* (12 species)
- b) *Poaceae* (10 species)
- c) *Asteraceae* (9 species)

Diversity indices

Diversity indices of Table 1.

Table 1:

Habitat Type	Species Richness (S)	Shannon Index (H')	Simpson's Index (D)	Evenness (J')
Semi-evergreen zone	88	3.42	0.92	0.85
Riparian zone	74	3.21	0.89	0.81
Deciduous patches	69	3.08	0.87	0.79
Grasslands	53	2.98	0.84	0.76
Disturbed areas	46	2.61	0.79	0.72

Discussion

The results indicate moderate to high plant diversity across the Nameri Forest Reserve, particularly in less disturbed zones. High diversity in semi-evergreen and riparian zones reflects ecological stability and resource availability. Lower diversity in disturbed areas suggests anthropogenic impact such as illegal logging, grazing, and land-use change. The dominance of *Fabaceae* and *Poaceae* aligns

with trends observed in other tropical and subtropical ecosystems. Quadrant sampling proved effective in capturing both common and rare species and can serve as a replicable tool for long-term monitoring [3,4].

Conclusion

The research indicated that biodiversity constitutes a large portion of the biomass and carbon reserves in forest ecosystems. The majority of the carbon reserves were contributed by the trees, while the herbaceous layer, comprising primarily grasses, contributed less. There was a significant relationship between biodiversity and carbon reserves, particularly with tree and climber species. However, grasses had an inverse relationship with biomass and carbon reserves. The findings of the study indicate that it becomes simpler to sequester carbon with an increase in the number of types of trees and climbing plants. However, it becomes very detrimental for carbon stores with an increase in the number of types of grass. In a forest ecosystem, this current study suggests that biodiversity characteristics should be used when considering potential numbers. The findings of this study indicate that the efficacy of stocking species-specific populations varies depending on several factors. In order to conserve and maintain the reserve woods secure, it is crucial to consider several ecological and structural characteristics. The Nameri Forest Reserve has numerous various types of plants that develop in various methods in various types of environments. Conservation practices must target areas with numerous varied plants and animals and establish programs at the community level to mitigate the impacts of humans. To have a better idea of the biodiversity of the region, it is advisable to conduct further research with a focus on seasonal variation and how animals influence each other. For a forest environment, the current research suggests that biodiversity characteristics should be considered when considering possible populations. The findings of this research indicate that the success of stocking species-specific populations relies on several variables. In order to safeguard and maintain the reserve woods secure, one should consider several environmental and structural aspects. The Nameri Forest Reserve contains numerous types of plants which develop in various manners in various habitats. Conservation needs to target areas where there is a lot of variety of plants and animals and establish programs at the community level to minimize the impact of human beings. In order to gain a better comprehension of the biodiversity in the region, it is advisable to research further and observe seasonal variation and how the animals interact with each other.

References

- Magurran AE (2004) Measuring biological diversity. *Current Biology* 31(9): R1174-R1177.
- Shannon CE, Weaver W (1949) The mathematical theory of communication. University of Illinois Press, USA, pp. 1-144.
- Champion HG, Seth SK (1968) A revised survey of the forest types of India. Government of India Press, India, pp. 1-612.
- Botanical Survey of India (2020) Flora of assam. Ministry of environment and forests, India.