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Exploration of floristic vegetation on Maliyabad forest a significant study in traditional value added plant

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Raichur is located at 16.2°N 77.37°E on Deccan plateau. It has an average elevation of 407 meters (1335 ft).Summers get really hot in this region with temperatures going beyond 40 °C. It receives rainfall during the months between May and August. Overall, the region is warm and humid during most part of the year. Ensconced between two prime rivers of the District, River Krishna and Tungabhadra. So far, Raichur is an important regional centre in the state of Karnataka. Cotton, groundnut, paddy and rice is grown in abundance due to the environmental factors.

However, Maliabad is a small village located in Raichur District, Karnataka. It is situated 10 km away from Raichur. Maliabad is popular for Historical fort and Monuments. It was regarded as key portion of Vijayanagara territory. It is also known as “Mallayya Banda” and it was well known for its scenic beauty. The total geographical area of Maliabad is 1793.38 hectares. It lies between 16.2° North latitude and 77.37° East longitude. The district is surrounded by Krishna River on the North and Tungabhadra river on the South. A climate of the district is concede by dryness for the major part of year is very hot (February to March) and cold during December to middle of February. The maximum temperature of 45.6°C and the minimum temperature of about 30.0°C have been recorded in this district. Savita and Kotresh (2022).

Maliabad reserve Forest of Kalyana Karnataka has a unique floristic wealth due to its dry deciduous and wide vegetation composition. It has rich diversity of plant species which include herbs, shrubs, trees, and climbers contributing its species richness. Floristic diversity refers to the variety of plant species in given region at a given time. It can be measured at any level from global diversity to ecosystem. The considerable variation in the vegetation of particular habitat is seen because of remarkable climatic change and physicochemical properties of soil. The

major soil types are reddish, light grey, reddish brown and black soil. Stohlgren *et.al., (*2000)

Our present work reveals the documentation and analysis of floristic diversity in Maliabad Reserve forest zone of Raichur district. The study also helps to understand the attributes of floristic vegetation and its conservation aspects. The study gives an idea about plant wealth and its potential values and also essential to identify ecosystem at a particular hierarchical level.(Fig.1. Location of Maliyabad).

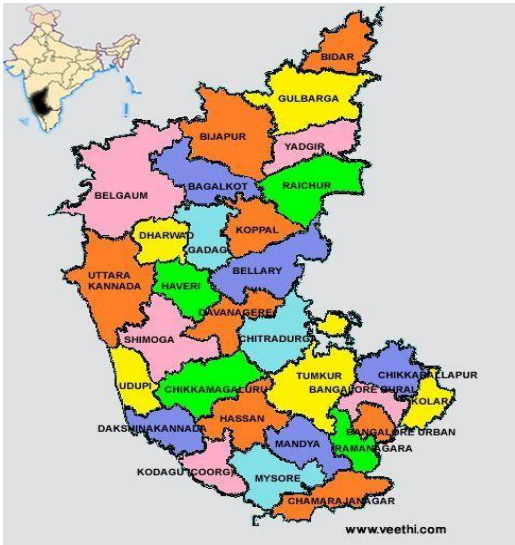

Table.1.A. Karnataka

Table.1.B. Raichur district map

EXPLORATION OF FLORISTIC STUDY

A random survey and quadrant in this region has lead to the identification of 84 plant species belonging to 75 genera and 36 families have been recorded. It is interesting to note that the Fabaceae members are dominant followed by Malvaceae, Lamiaceae, Asteraceae, Apocynaceae, Euphorbiaceae and Solanaceae. (Fig.2. Plant sp.).

Examination of floristic diversity

An analysis of the habit composition of plant species of the study area reveals predominantly occur 33 species of shrubs. Similarly herbs were 27, and followed by 15 tree and 5 species of climbers respectively. Out of which 76 species were Dicots and 8 species were Monocots. Basavaraj *et.al.*, (2023)

The survey was carried out in 2023 during August through November. Utilizing the flora, such as "Flora of Gulbarga District," all plants were identified. Uplaonkar *et.al.,* 2000. There aren't many large forests because of the tropical environment and sparse vegetation. There is scrubby vegetation at Maliabad Fort. Understanding the state of the plants in the Raichur region

is crucial. The district's total forest area, covering around 18,167 hectares of open scrub jungle and mixed dry deciduous forests, is made up of both protected and unclassified woods. Maliabad is home to a variety of plant species, including tamarind, neem, and acacia. Many rare and endemic plant species may be found in Maliabad, which is renowned for its vast biodiversity. The abundant plant life is a result of the area's rich soil and pleasant environment.

The region has a significant diversity of medicinal plants, with an estimated 40 plant species being used traditionally by the local population. In the Maliabad region, plants that generate timber are also more significant environmentally and economically. This demonstrates how crucial it is to preserve the flora. Yogashree *et.al.,(*2021).

There were no earlier studies conducted on the floral diversity of Maliabad. So that the present study is conducted to explore the diversity in plants species of this region. However, the plant species relatively greater in rainy season than summer. It is evident from the study that, Angiosperms were dominant and found throughout the year.

Anthropogenic activities have resulted in the rapid decline of ecosystem leading to decrease floristic diversity so that it is necessary for effective management of biodiversity. Habitat fragmentation is considered as one of the most serious threat and is the primary cause of extinction crisis.

Globally, a great deal of research has been done on floristic variety. The study of the floristic pattern can also be done using the plant's characteristics, such as size, form, and whether it is woody, herbaceous, or evergreen. The majority of floras serve as the species' habitats, and maps showing the "probable distribution" of the species were created using this data. It offers data regarding the number richness of species, genera, and families. Vinayakumar (2018)

BROADER CONCEPTS OF BIODIVERSITY

World Health Organization (WHO) has estimated that as much as 80% of the world's population depends on traditional medicine for their primary healthcare requirements**.**

According to Farnham, T. J. (2005, June)., the term Biological Diversity includes two related concepts, genetic diversity and ecological diversity.

India is one among the 12 mega biodiversity of the world. The other countries are Mexico, Columbia, Brazil, Peru, Ecuador, Madagascar, Indonesia, Malaysia, China, and Australia. India is one of the most diverse biogeographically region and topography covered with high Himalayan ranges to plains at sea level.

Bindra, P. S. (2017). clearly narrated ecological niches and the types of habitats vary

from the humid tropical Western Ghats to the hot Deserts of Rajasthan from cold deserts of Ladakh to the long warm coast line stretches of peninsular India. A great variety of climatic and altitudinal variations coupled with varied ecological habitats have contributed immensely to the rich vegetation wealth, and varied flora and fauna generating very unique biodiversity in India.

In 2001, Gibbs studied on Indian Bio Diversity having approximate numbers of species plants, animals, microorganisms which have been identified and described from all over the world. The known described species of all organisms on the earth is between 1.7 and 1.8 million which in fewer than 15% of the actual number. The predicted number of total species varies from 5 to 30 million. Averaging at 14 million. About 61% of the known species are insects.

The Species richness diversity due to over geological times the tropics had a more stable climate than the temperate zones. In tropics, therefore, local species continued to live there itself, where as in temperate they tend to disperse to other areas. The Tropical communities are older than temperate one's and therefore, there has been more time for them to evolve. This could have allowed them greater degree of specialization and local adaptations of richness of species. Warm temperatures and high humidity in most tropical areas provide favorable conditions for many species that are unable to survive in temperate areas. Aggemyr *et al.,* (2018)

So far, UNEP 1992 , According to this , Biodiversity refers to 'The variability among living, inter alia, terrestrial, marine and other aquatic systems and the ecological complexes of which they are part, this includes diversity within species, between species and of ecosystems'. The second most used definition of Biodiversity is sponsored by the Global Biodiversity Strategy.

In Ratnadas *et.al,*. (2012). published their work on the tropics, revealing increased disease, parasite, and insect load. But it prevents a single species from ruling over another, giving them a chance to thrive and continue to exist. Conversely, fewer dominant species and colder temperatures in temperate zones lead to less pest impact, as many other plant species tend to cross more frequently in tropical regions. Consequently, increased genetic variety is a result of increased out crossing rates. But throughout the year, solar radiation is stronger in tropical regions. Because of their larger resource base and higher productivity, tropical communities are able to sustain a wider variety of species. The fact that there are so many definitions of the biodiversity notion thus far reflects its complexity. These two definitions, according to Di Castri and Younès (2000), pay very little attention to the interactions within, between and among the various levels of biodiversity recognized. According to this interaction is the principal intrinsic

mechanism that shapes the characteristics and functions of biodiversity and Di Castri and Younès argue that structural and functional attributes of biodiversity can only be determined by employing appropriate scales of space and time Gallardo-Cruz *et.al,*. (2012). Consequently, biodiversity should not be construed as a 'simple umbrella covering a mosaic of heterogeneous activities', but should represent a composite entity 'shaped by the continuum of all its elements and their interactions'. These interactions, according to them are of a hierarchical nature and by interlocking the genetic, species and ecosystem diversities one can achieve the 'classical zooming effect of hierarchical theory'. The important outcome of such an approach is that the properties of biodiversity that do not 'occur' at a lower scale of integration at gene levels will 'appear' at a higher scale species or ecosystem level. The properties that are 'evident' at a higher scale 'disappear' at a lower scale. The hierarchical concept, so obtained, has been expanded and made more accurate.

According to Tilman and Polasky S. (2012) Human beings cannot survive on this planet without food, shelter, clothing and more essentially oxygen for breathing as they play an important role in human life. Ancient Indian literature indicates that therapeutic uses of plants have been practiced since as long ago as 5000-4000 B.C though in the modern era, most rural and tribal communities who live close to the forest depend on plants for their daily needs**.**

According to Kumar s *et.al., (*2018) Floral diversity is the prime component of biological diversity, represented by medicinal, edible, economic, and socio-cultural plants as well as by diverse other floras that are beneficial to humans and the environment. According to Catarino, L., Havik *et.al,*. (2016). Floral diversity is directly proportional to chemical diversity (bioactive compounds), as reflected in the traditional knowledge of the aboriginal peoples and this area of science is known as "Ethno botany" or sometimes ethno pharmacology. Ethno-medicinal studies offer immense scope and opportunities for biodiversity conservation and sustainable development of local communities around the world**.** Today, there is an increasing desire to reveal the role of ethno-botanical knowledge by capturing centuries old traditional folk knowledge from elderly people as well as by searching for new plants species of medicinal and economic importance Sandhyasri *et.al.*,(2017).

As per the Traditional medicine is a combination of both knowledge and practices, whether explainable or not. It is used in disease diagnosis and treatment, prevention and elimination of physical, mental or social imbalance and relies exclusively on practical experience and observations that are transferred from generation to generation by individuals.

According to Yadav *et.al.,* (2017). The medicinal potential of plant species and parts that are used for the preparation and administration of various drugs vary with climate and environmental conditions. However, the knowledge of herbal medicine is gradually dying out, although some traditional herbal healers around the world continue to practice the art of herbal healing effectively. Floral diversity is not only present in near the forest or rural areas, but it is also present in small patches of urban areas, mainly campuses of educational institutions and other government bureaus. These areas play a vital role in balancing pollution and other environmental factors in urban environments. Keeping this in mind, an attempt has therefore been made to document the useful flora in and around the Steel City (Rourkela) of Odisha State in India and its ethno botanical potential.

Levels of Biodiversity can be measured at various levels of biological organization accordingly divided into three types Genetic Diversity, Species Diversity and Habitat Diversity. The Genetic diversity refers to the variation among the same species and it denotes the diversity population of the same species such variations are due to the Differences in genetic constituents of individuals. In other words every individual is unique in genetic characteristics. Similarly species diversity, the number of different species present in a geographical region is habitat, it measures at level of species. As species represents easily recognizable unit of biological organization, species diversity is the easiest method in measuring biodiversity. In additions to the ecosystem are habitat diversity noticed the variety of ecosystem are habitats occurring a particular geographical region. Ecosystem biodiversity is assemblies of many different species interact with the surrounding non living factors like ponds, rivers, forest, grass, lands.

Floral Diversity covers biotic, abiotic regions of rural and urban areas, Educational institutions**.** Each of these ecosystems has its own set of species. The set of species found pond ecosystem is different form set of species in a forest. Therefore, biodiversity increase with types of ecosystem. In other words, a region supporting many different ecosystem or habitat will richer in biodiversity than another area.

According to Opuni-Frimpong, *et.al,.*(2021) Biodiversity is potential reserves of state and country it preserving and protecting the potential resource base for posterity is both a profitable venture for and an imminent responsibility of the states. However it assume at understanding of what resources we have and where they exist. Such information based on the biological resources and their geographic distribution, It helps the states in deciding a need based allocation of conservation efforts and facilitates ascribing and claiming, appropriate rights over these

resources.

In addition to that we have launched a major programmed on developing a comprehensive database to document the biological resources and their geographic distribution for the entire country. It is an essential step for compiling information about flora vegetation from different sources. To begin with, focus on South India and now compiled a database from about 200 flora and related literature. This article revive gives detailed patterns and analysis the compiled data from over 30 flora on Karnataka's angiosperm diversity.

According to K N Ganeshiah *et.al.,* (2002). Total number of species in each district arrived in two ways : i) On the basis of species recovery data, All the species for which the specimen has been reported from a district was assigned to that district. ii) On the basis of the habitats and biotic zones.

If any of the grids (0.1° x 0.1°) of the district confirmed to the biotic zone and or contained the set of habitats and or type of vegetation in which the species was stated to be commonly occurring, that species was listed under that district. The total number of species in a district was arrived from the remarkable from the two methods. As per our survey of "Karnataka has 4758 species from 1408 genera and 178 families" and accounts for 27% of the floral richness of the entire country. Our database thus suggests that Karnataka is richest 800 species and 50 genera as reported earlier.

According to K N Ganesh *et.al.,* (2002) Out of 4758 species, 275 species are found only few districts. Whereas the most of these species with very restricted' distribution are found in and around the Western Ghats (Dakshina Kannada, Mysore, Hassan, Kodagu, Uttara Kannada and Udupi districts), Amid districts such as Kolar, Tumkur, Dharwad, Bidar and Bijapur also have a few species that exhibit 'very restricted' distribution in the state . On the basis of the frequency distribution of such 'very restricted' species, we computed an endemicity value for the districts as.

Endemicity value = $\sum_{i=1}^{5}(n_i/\mathrm{i})$,

Where n, is the no. of 'very restricted' species of the focal district spread over i no. of districts. The index cumulates the proportion (n/i) over five categories of 'very restricted' species, i.e. species spread over one to five districts only. Thus the endemicity value of a given district is directly proportional to the no. of 'very restricted' species in it (n), and inversely to the spread or occurrence of these species (i).Earlier work has been reported by Dr. Prashant Kumar (2020). On "Plant species diversity in Kolanki hills of Raichur", They suggested that the plant species

diversity mainly relevant to change in climate of the area. Which shows total 39 species and 38 genera belonging to different 26 families have been recorded. Plant species belonging to families such as Fabaceae, Acanthaceae, Euphorbiaceae, Apocynaceae are majorly found.

A survey on flora of Raichur fort, study reveals 158 plant species belonging to 39 families of Angiosperms, 4 species of Pteridophytes, 3 species of Bryophytes and 4 species of Algae identified and collected there for floristic diversity of fort may be due to the topography of soil and climatic conditions of the region. Further similar work conducted on "Floristic Diversity of Jnana Tunga Campus, Yergera, Raichur district "has given by R.Savita and K. Kotresha (2022).

The survey data reveals 295 plant species belonging to 233 genera and 70 families of Angiosperms. Herbs are predominant with 186 species, followed by trees with 54 species, shrubs with 35 species, climbers with 18 species respectively. Plant species belonging to the family Fabaceae are abundant. However, so many taxonomist worked on floristic diversity of Raichur. Perhaps, “Plant Species Diversity in Mallikarjun Rocky hills of Raichur" work has been reported by Dr.Prashant Kumar (2020)**.** A total of 41 species belonging to 41 genera and 29 families have been recorded. It is observed that total number of plants in rainy season and lower in summer season. Rocky hills represent more dicotyledons Thirty five plants as compared to monocotyledons Six Plant species belonging to Fabaceae and Asteraceae are dominant followed by Apocynaceae, Lamiaceae, Malvaceae, Solanaceae and Poaceae respectively.

Several researchers worked on floristic diversity on different habitats, they clearly mentioned about benefits of plant diversity to ecosystems effects immediate, filter and founder effects H.C.Shrishail, Madhura (2019). They have also studied difference between the immediate effects of species richness on ecosystem. Further it has effect on a longer time scale. So for relationships between plant diversity and ecosystem properties can be explored by the key component for classifying the species into three categories - Dominants, Subordinates and Transients. In 2014 H.Peter and Linder noted on "Evolution of African Plant Diversity" and He concluded that Sub-Saharan Africa includes 45,000 plant species and the plant diversity is unevenly distributed with Southern Africa, disproportionally species rich while West Africa is species poor. Similarly, Gerold Kier, Jens Mutke, Taylor.H and others worked on "Global patterns of plant diversity and floristic knowledge" (2005).They studied plant species richness in the Borneo lowlands eco region followed by nine ecoregions located in Central and South America all are found in tropical and subtropical moist broad leaf forests biome.

Accordingly, Dakshina Kannada, Uttara Kannada, Mysore and Hassan districts were found to have the highest endemicity values. Since endemicity value of the districts was also found to be correlated with the species richness, these same districts stand out as being the most species.

A cluster analysis of the districts, based on the species richness of all the 178 families recorded in them, was attempted. The inter-district similarity values were estimated as Squared Euclidean Distances of differences in the number of species in the families between any pair of districts. These were subjected to un weighted pair group average analysis for clustering. The clustering resulted in a clear segregation of the districts into three zones approximately corresponding with the agro-climatic and bio-geographic zones are high rainfall, Western Ghats zone (cluster 1) with an average of 22.65 ±0.53 species per family (average of 177 families per district, total 178 families), Low rainfall, dry tract districts (cluster 3) with 16.61±0.75 species per family (average of 168 families per district, total 172 families) and the transitional zone of nine districts (cluster 2) with 20.29 ±0.58 species per family (average of 174 families per district, total 178 families). This and grouping of districts was reflected their segregation along with endemicity gradient and species richness of the district as well.

Similarly segregation of the districts on the basis of spescies richness, packing of the families even major taxonomic groups exhibit differential preference with respected geo-climatic zones and Leguminosae and Gramineae, the most species-rich families, had relatively uniform richness of species across districts. However, certain families, e.g. Orchidaceae, Acanthaceae, Euphorbiaceae, Cyperaceae, Asteraceae and Rubiaceae showed relatively higher variation across districts for species packing in the families, suggesting their specialization to specific zones than to others. Such predominance of families in specific areas and segregation of districts based on the species richness within families suggest that even the species-poor dry tracts have distinct floral assemblages uniquely different from those of the species-rich areas such as the Western Ghats. Thus these dry-tract districts also demand conservation attention, as do the biotically-rich areas of the Western Ghats.

AUTHORS CONTRIBUTION

D K collected the Survey report on the Survey on the Floristic Study Of Maliabad Forest area Raichur, Karnataka, G D helped in writing the review paper, R H corrected the manuscript.

Declaration

The authors declare that they do not hap any conflict of interest.

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PHOTO PLATE - 1

Aloe vera (L.)

Calotropis gigantea(L.)W.T.Aiton

Calotropis gigantea(L.)W.T.Aiton

Calotropis procera R.Br.

Catharanthus roseus(L.)G.Don

Canavalia rosea (Sw.)Dc

PHOTO PLATE -2

Caesalpinia pulcherrima (L) Sw.

Coccini grandis (L.) Voigt.

***Commelina benghalensis* L.**

***Corchorus trilocularis* L.**

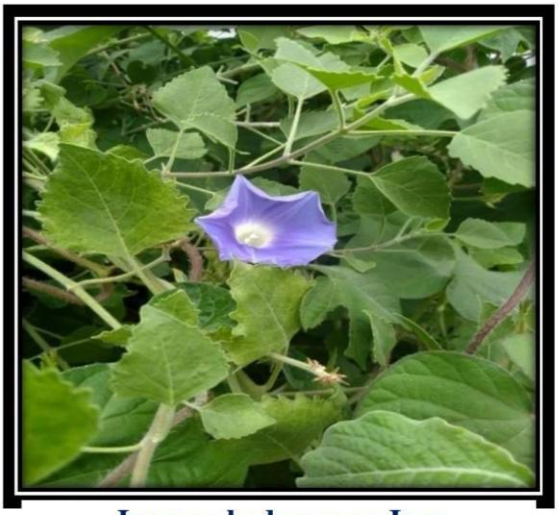
***Datura innoxia* P.miller.**

***Mimosa pigra* L.**

PHOTO PLATE -3

Hibiscus trionum L.

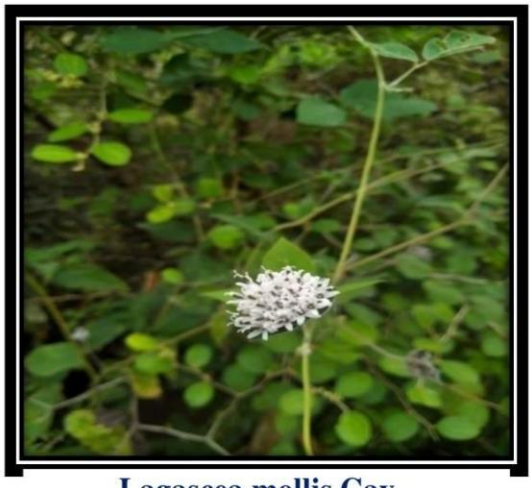
Ipomea carnea Jacq.



Ipomea hederaceae Jacq.

Ipomea stenosiphon Hallier f.

Martynia annua L.



Lagascea mollis Cav.

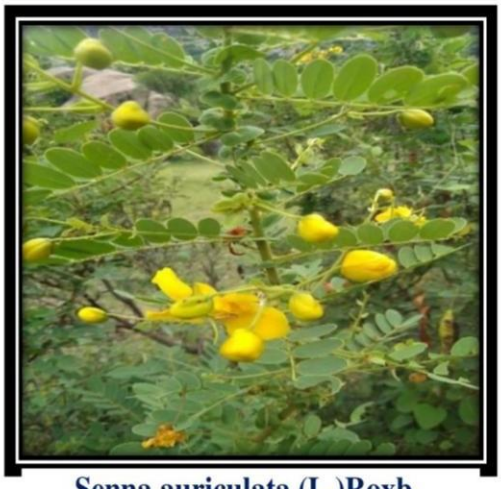
PHOTO PLATE - 4

Lantana camara L.

Mimosa pudica L.

Muntingia calabura L.

Neptunia plena(L.)Benth.



Senna auriculata (L.)Roxb.

Senna fistula L.

PHOTO PLATE – 5

Tribulus terrestris L.

Tribulus terrestris L.

FIG. 2. PLANT SPECIES SURVEY ON FLORISTIC DIVERSITY IN MALAYABAD