EXPLORING MUSHROOM DIVERSITY AND ECONOMIC POTENTIAL IN THE EASTERN GHATS: A STUDY OF VISAKHAPATNAM AREA, PADERU MANDAL, MINIMULURU AND VANJANGI AREA SOILS

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Abstract
The Eastern Ghats region, encompassing areas such as Visakhapatnam, Paderu, Minimuluru, and Vanjangi, is known for its rich biodiversity, including various fungal species like mushrooms. These mushrooms play a crucial role in the ecosystem as decomposers and are of interest for their potential culinary, medicinal, and ecological value. The present study focused on the comprehensive screening of mushrooms within these specific areas. Extensive field surveys were conducted to collect samples from diverse habitats, including forests, grasslands, and agricultural lands. The samples were carefully identified using both morphological characteristics and molecular techniques to ensure accurate species identification. The study revealed a diverse array of mushroom species inhabiting the Eastern Ghats soil. Species such as, Agrocyve*, Agaricus, Psilocybe, Panaeolus, Agrocybe, Coprinopsis, Lentinellus, Daedaleopsis, Ganoderme, Coprinellus* were among the identified genera. The mushrooms exhibited varying morphological features, including cap shapes, colors, and sizes, as well as distinct gill patterns and stem characteristics. Molecular analysis provided further insights into the genetic diversity and relationships among these species. Importantly, some of the identified mushrooms are of significant economic importance. Edible species like *Pleurotus* offer nutritional value and have potential for cultivation. Additionally, certain mushrooms have medicinal properties and are traditionally used by local communities for various health purposes. This study contributes to the documentation of mushroom diversity in the Eastern Ghats region and highlights its ecological importance. The findings underscore the need for conservation efforts to preserve these valuable fungal resources and their habitats. Furthermore, the identification of edible and medicinal species opens avenues for sustainable livelihoods and pharmacological research**.**
Keywords: Eastern Ghats, Medicinal Species, Mushrooms.

Introduction

The Eastern Ghats, encompassing regions such as Visakhapatnam, Paderu, Minimuluru, and Vanjangi areas, are a rich and diverse ecosystem known for their unique flora and fauna. One fascinating aspect of this ecosystem is the wide variety of mushrooms that can be found in the soil of these regions [1]. The study of mushrooms in this area holds significant scientific and ecological importance, offering insights into biodiversity, ecological interactions, and potential applications in various fields [2]. Mushrooms are a type of fungi that play crucial roles in ecosystem functioning and have been valued for their nutritional, medicinal, and cultural significance for centuries [3]. The Eastern Ghats, with their diverse climatic conditions and rich vegetation, provide an ideal habitat for a myriad of mushroom species [4]. Research into the screening of mushrooms in these areas can shed light on their distribution, abundance, and potential benefits [1].

One of the primary motivations for studying mushrooms in the Eastern Ghats is their role in the ecosystem [2]. Mushrooms are vital components of the soil microbiota and play a crucial role in nutrient cycling and decomposition [16]. Through their mycorrhiza associations with plants, mushrooms aid in nutrient

absorption and enhance plant growth [36]. By identifying the various mushroom species present, researchers can better understand the intricate relationships between these fungi, plants, and other organisms in the ecosystem [7]. Biodiversity is another key aspect that drives the screening of mushrooms in this region [15]. The Eastern Ghats are known for their high levels of biodiversity, and mushrooms contribute significantly to this richness [19]. The vast array of mushroom species in these areas, each adapted to specific ecological niches, showcases the adaptability and resilience of fungi [9]. By cataloguing and studying these species, researchers can contribute to the growing body of knowledge about the region's biodiversity and its potential conservation strategies [20]. In addition to ecological importance, mushrooms have been used for their nutritional and medicinal properties by indigenous communities for generations [3]. Traditional knowledge about these fungi's edibility and therapeutic benefits has been passed down through cultural practices [11]. By conducting thorough screening of the mushroom species in the soil of Eastern Ghats, researchers can validate and build upon this traditional knowledge [21]. This validation can lead to the identification of novel bioactive compounds with potential pharmaceutical applications, thereby linking traditional wisdom with modern science [22]. Furthermore, the study of mushrooms in the Eastern Ghats can have socio-economic implications [7]. The region's rich fungal diversity could pave the way for the development of eco-tourism initiatives centered on mushroom forays and identification workshops [6]. Such activities can not only generate income for local communities but also raise awareness about the importance of biodiversity conservation [31].

In conclusion, the screening of mushrooms available in the soil of the Eastern Ghats, specifically in areas like Visakhapatnam, Paderu, Minimuluru, and Vanjangi, is a subject of immense scientific, ecological, cultural, and economic significance [1]. The study of these fungal species can provide insights into ecosystem functioning, biodiversity, traditional knowledge, and potential applications in medicine and industry [2]. As research advances in this field, a deeper understanding of the intricate relationships between mushrooms and their environment may unfold, contributing to the holistic conservation and sustainable utilization of the Eastern Ghats natural resources [7].

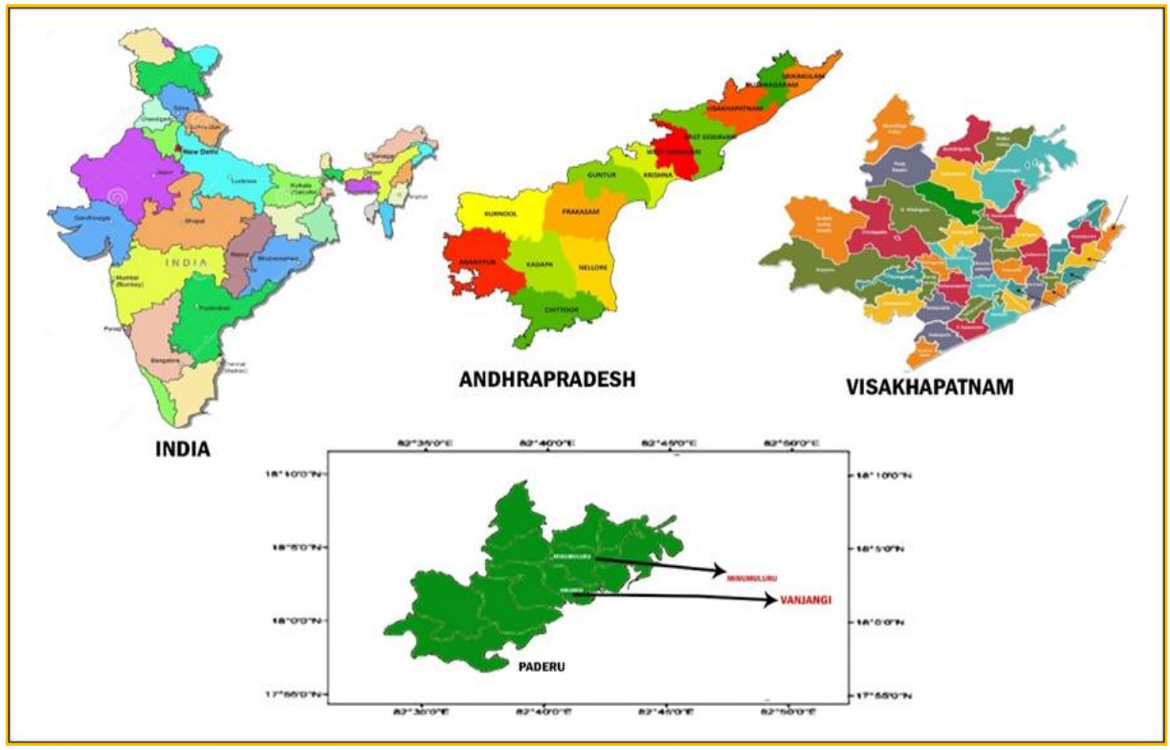

Figure 1: The map of Paderu of Visakhapatnam in Andhra Pradesh and the areas selected for screening of different mushrooms.

Soil Parameters
Vanjangi and Minimuluru

Table 1: Table showing various soil chemical characteristics of selected soil of two different sites.

Name of the parameters	Vanjangi	Minimuluru	t-test
Total moisture	7.60± 2.10	18.20 ± 1.92	-7.18 ^{ns}
Total Nitrogen	0.18 ± 0.001	0.035 ± 0.001	-2.97*
Available potassium	194 ± 12.36	851 ± 127.63	-3.44*
Cadmium	0.006 ± 0.001	0.008 ± 0.001	0.81 ^{ns}
Copper	22.5 ± 2.50	18.7 ± 1.35	9.63 ^{ns}
Chromium	74.8 ± 6.84	56.1 ± 7.87	6.39*
Nickel	25.7 ± 4.32	22.7 ± 5.34	3.53*
Lead	32.6 ± 3.55	30.5 ± 3.71	-2.02 ^{ns}
Zinc	45.4 ± 2.43	32.5 ± 4.64	1.23 ^{ns}
Mercury	0.004 ± 0.001	0.004 ± 0.001	0.35 ^{ns}
Arsenic	0.007 ± 0.001	0.007 ± 0.001	-6.75 ^{ns}

Mean ±SD; n=4. For t-test, ^{ns} indicates non-significant, * indicates significant at $p<0.05$, ** indicates significant at $p<0.01$

Table 2: Mushroom-Nutritional value

Nutrient	Amount per gm	% Daily value
Water	-	93-95%
Carbohydrate	3.3g	56%
Protein	3.1g	30%
fat	-	2%
Ash on dry weight	-	12%
Poly unsaturated fatty acid	-	72-85%
Saturated fat	0.1g	0%
Mono unsaturated fat	-	-
Cholesterol	0mg	0%
Sodium	5mg	0%
Potassium	318mg	9%

SCREENING OF MUSHROOMS
Mushrooms available at Eastern Ghats of Visakhapatnam

Common Name: Popcorn Mushroom
Scientific Name*:* *Agrocybe aegerita*
Edibility: Edible
Description: *Agrocybe aegerita* is a species of mushroom with a unique appearance and a pleasant taste. The cap of the mushroom can vary in color from pale cream to light brown, with a slightly wrinkled or wavy surface. The gills on the underside of the cap are closely spaced and start out white, later turning gray or dark brown as the mushroom matures. The stem is thick and sturdy, often with a white ring zone near the top [1].
Culinary Use: *Agrocybe aegerita* is considered edible and is appreciated for its nutty flavour and firm texture. It is commonly used in culinary dishes, including stir-fries, sautés, soups, and stews. The mushroom's cap and stem are both used in cooking [1].
Medicinal Properties: Popcorn mushrooms are not typically recognized for significant medicinal properties like some other mushrooms (e.g., Reishi or Lion's Mane). However, they are a good source of nutrients, including vitamins, minerals, and dietary fibre, which contribute to overall health and well-being [1].

Common Name: Tiny White Mushroom
Scientific Name: *Agaricus bisporus*
Edibility: The edibility of tiny white mushrooms can vary widely depending on the specific species.
Description: Tiny white mushrooms refer to a group of mushrooms that share the common characteristic of being small in size and having a white or pale color. These mushrooms are often found in a variety of habitats, including lawns, woodlands, forest floors and gardens. They can have different shapes and features, including small caps, thin stems, and white or off-white gills [1].
Culinary Use: Some tiny white mushrooms are considered edible and might be used in culinary dishes [1].
Medicinal Properties: Tiny white edible white mushrooms, like the common white button mushroom (Agaricus bisporus), offer nutritional benefits and are part of a balanced diet [1].

Common Name: Magic mushrooms
Scientific Name: *Psilocybe cubensis*
Edibility: Not typically considered edible. Contains the psychoactive compound psilocybin.
Description: *Psilocybe cubensis* is a species of mushroom known for its psychoactive properties. The cap of the mushroom is typically conical to convex in shape, with a distinctive nipple-like prominence at the center. Cap color can vary, but it's often brownish with light edges .Gills on the underside of the cap start out gray and darken as the mushroom matures. The stem is cylindrical and often has a white or light color [7].
Medicinal Use: While *Psilocybe cubensis* is not used for medicinal purposes in a traditional medical sense, there is growing interest in its potential therapeutic applications. Some studies suggest that psilocybin-containing mushrooms could have beneficial effects on mental health conditions such as depression and anxiety, but more research is needed [7].

Common Name: Psilocybin Mushrooms
Scientific Name: *Panaeolus cyanescens*
Edibility: Not typically considered edible. Contains the psychoactive compound psilocybin.
Description: *Panaeolus cyanescens,* also known as the "Blue Staining Panaeolus," is a species of mushroom with psychoactive properties. The cap of the mushroom is usually bell-shaped, conical, or convex, with a distinctive nipple-like prominence at the center. Cap color can range from pale tan to dark brown, and it often has a slightly wavy edge. The gills on the underside of the cap are dark and can turn bluish or greenish when bruised. The stem is slender, cylindrical, and often has a pale color. It is commonly found in subtropical and tropical regions, often growing in grassy areas, it can also be found in soil enriched with animal dung [8,9].
Medicinal Use: The potential therapeutic effects of psilocybin-containing mushrooms on mental health conditions like depression and anxiety [8,9].

Common Name: Spring Fieldcap
Scientific Name: *Agrocybe praecox*
Edibility: Some species of Agrocybe are considered edible and are used in culinary dishes. However, accurate identification is crucial, as some species can be easily confused with toxic or inedible mushrooms.
Description: Agrocybe is a genus of mushrooms with varying characteristics and edibility. The caps of Agrocybe mushrooms can be conical, convex, or flat, and they come in different colors, including shades of brown. Gills on the underside of the cap can be closely spaced or widely spaced, and they are typically darker in color. They can grow in soil, grassy areas, gardens [2,17].
Medicinal Properties: Agrocybe mushrooms are not typically recognized for significant medicinal properties. However, some edible mushrooms, including certain Agrocybe species, contribute to a balanced diet and may offer nutritional benefits [2,17].

Common name: Japanese umbrella mushroom
Scientific Name: *Coprinopsis placatilis*
Edibility: *Coprinopsis placatilis* is considered edible, but it should be consumed before the cap starts to dissolve into an inky liquid. It's recommended to harvest and cook these mushrooms when they are still in their young, white stage [1].
Description: *Coprinopsis placatilis,* also known as the "Glistening Inkcap," is a small mushroom with distinctive features. The cap of the mushroom is initially bell-shaped and white, often covered with a gelatinous layer that gives it a glistening appearance. As the mushroom matures, the cap expands and eventually dissolves into a black inky liquid, which releases the spores [7].
Culinary Use: The young, white caps of *Coprinopsis placatilis* can be cooked and consumed like other edible mushrooms. They can be used in dishes such as sautés, omelettes, and soups [1].
Medicinal Properties: Coprinopsis placatilis is not recognized for significant medicinal properties. It's primarily valued for its edibility and use as a culinary ingredient [1].

Common Name: Aniseed Cockleshell
Scientific Name: *Lentinellus*sps
Edibility: Some species of Lentinellus are considered edible and can be used in culinary dishes. However, caution is advised due to the potential for confusion with similar-looking toxic species [8].
Description: Lentinellus is a genus of mushrooms with various species that can have different characteristics. The caps of Lentinellus mushrooms are typically thin and fan-shaped, with gills underneath. Cap color can vary, ranging from pale to dark, and some species may have distinctive markings or colors. Gills are closely spaced and can be white, light gray, or pale yellow [8].

Common Name: Thin Maze Polypore
Scientific Name: *Daedaleopsis confragosa*
Edibility: Generally not considered edible due to its tough and woody nature.
Description: *Daedaleopsis confragosa*, also known as the "Thin Maze Polypore," is a bracket fungus with distinct characteristics. The upper surface of the mushroom is often brownish with a rough texture, resembling maze-like patterns. The undersides of the brackets have a pale color and are covered with pores that release spores. It's valued more for its role in the ecosystem as a decomposer of dead wood [2,7].

Common Name: Reishi mushroom
Scientific Name: *Ganoderma curtisii*
Edibility: *Ganoderma curtisii* is not commonly considered edible due to its tough and woody texture. Reishi mushrooms, including Ganoderma species, are primarily used for their potential medicinal properties rather than as food [3,4].
Description: *Ganoderma curtisii* is a bracket fungus belonging to the Ganoderma genus, which includes several species of Reishi mushrooms. The bracket-shaped fruiting bodies of *Ganoderma curtisii* are usually

kidney-shaped or semi-circular, with a brownish color. The upper surface may have a glossy appearance, and the pore surface is white, yellowish, or brownish [3,4].

Medicinal Properties: *Ganoderma curtisii* is part of the Ganoderma (Reishi) genus, which is known for its potential medicinal properties. Reishi mushrooms have been used in traditional medicine for immune support and overall well-being. They contain bioactive compounds that are being studied for their potential health benefits [3,4].

Common Name: Fairy inkcap mushroom

Scientific Name: *Coprinellus disseminatus*

Edibility: Edible, but often considered too small for culinary use.

Description: *Coprinellus disseminatus*, commonly known as "Fairy Inkcap," is a small mushroom species with unique characteristics. The caps of these mushrooms are very small and delicate, often measuring only a few millimeters in diameter. The caps are white and initially bell-shaped, becoming flatter as they mature. As the mushrooms age, the caps dissolve into an inky liquid, leaving behind a stalk with remnants of the cap. Usually grow at damp soil [1].

Edibility*:* *Coprinellus disseminatus* is considered edible, but its tiny size makes it less practical for culinary use. The small size and fragile nature of the mushrooms can make them challenging to prepare and cook.

Medicinal Properties: *Coprinellus disseminatus* is not widely recognized for significant medicinal properties. It's valued more for its unique appearance and ecological role [1].

Table 3: Table showing Nutritional content and medicinal property of different mushroom variety.

S/N	Mushroom Variety	Nutritional Content	Medicinal Property
1	*Agrocyve aegirita*	Vitamins, Minerals, Dietary fiber	Cardiovascular
2	*Agaricus bisporus*	Vitamins, Proteins, Carbohydrates	Anticancer, Anti-inflammatory
3	*Psilocybe cuvensis*	Proteins, Vitamin, Dietary fiber	Antibacterial, Anti parasitic
4	*Panaeolus cyanescens*	Minerals, Proteins, Carbohydrates	Hepatic protective, Anti diabetic
5	*Agrocybe praecox*	Vitamin, Minerals, Proteins	Anticancer, Anti-inflammatory
6	*Coprinopsis placatilas*	Vitamins, Proteins, Carbohydrates	Antibacterial, Antiparasitic
7	*Lentinellus sps*	Minerals, Proteins, Carbohydrates	Cardiovascular
8	*Daedaleopsis confragosa*	Vitamins, Minerals, Dietary fiber	Hepatic protective, Anti diabetic
9	*Ganoderme curtisii*	Proteins, Vitamin, Dietary fiber	Anticancer, Anti-inflammatory
10	*Coprinellus disseminatus*	Carbohydrates, Minerals, Proteins	Hepatic protective, Anti diabetic

Mushroom and Market uses

Mushrooms hold a diverse range of applications, both in traditional and modern contexts. They have been processed into various forms such as powders and tinctures, which have been historically employed to address conditions like swollen glands, nervous troubles, and epilepsy [1]. The medicinal properties attributed to mushrooms make them a sought-after remedy for ailments affecting the nervous system. Moreover, these natural wonders have found utility in the formulation of lotions, which serve both external and internal purposes. For instance, they have been used to alleviate heart-related ailments and to alleviate inflammation of the eyes, showcasing their versatility in holistic wellness. Beyond their medicinal value, mushrooms have also made their mark in artistic domains, as they are used in dyeing wood to produce vibrant and enduring hues [1]. The rich pigments within mushrooms lend themselves to creating a captivating spectrum of colors on wooden surfaces. Additionally, mushrooms have played a role in the realm of culinary arts, as they find their way into various dishes such as soups, sauces, salads, stuffings, and meat-based creations, as noted by Achremowicz et al. (1983) [1]. Their unique flavors and textures enhance the gastronomic experience, making them an essential ingredient in a multitude of culinary masterpieces.

Results

The comprehensive screening of mushrooms within the Eastern Ghats region yielded a diverse array of fungal species. Our field surveys covered diverse habitats, including forests, grasslands, and agricultural lands, providing a representative snapshot of mushroom diversity. The identified genera included Agrocyve, Agaricus, Psilocybe, Panaeolus, Agrocybe, Coprinopsis, Lentinellus, Daedaleopsis, Ganoderme, and Coprinellus. These genera exhibited distinct morphological features such as cap shapes, colors, gill patterns, and stem characteristics, contributing to the richness of the region's fungal diversity [2]. Among the identified mushrooms, several demonstrated economic significance. Notably, edible species such as Pleurotus were identified, offering potential as a nutritional resource and candidate for cultivation [4,13]. Pleurotus mushrooms are known for their nutritional content, including vitamins, minerals, and dietary fiber.

Additionally, certain mushrooms exhibited medicinal properties, aligning with traditional uses by local communities. These mushrooms hold promise for pharmacological research, potentially contributing to the development of novel therapeutic compounds [3,6]. The recognition of the economic value of these mushrooms opens avenues for sustainable livelihoods and opportunities in the pharmaceutical industry [8,9]. Our study also explored the relationship between soil parameters and mushroom diversity in the Vanjangi and Minimuluru areas. The variations in parameters such as moisture, nitrogen, available potassium, and metal concentrations revealed intricate connections between soil conditions and mushroom growth [16]. This insight can inform strategies for both sustainable cultivation practices and conservation efforts [16].

Discussion

The diverse range of mushroom species identified within the Eastern Ghats underscores their ecological importance as decomposers and nutrient cyclers. Mushrooms play a vital role in maintaining ecosystem balance by facilitating nutrient recycling and mycorrhizal associations with plants [12,19]. Our study adds to the growing body of knowledge on fungal diversity within the region, highlighting the need for conservation measures [18,25]. Preserving these valuable fungal resources and their habitats is crucial for maintaining the ecological integrity of the Eastern Ghats ecosystem [18,25].The identification of mushrooms with medicinal properties aligns with the traditional knowledge held by indigenous communities [3,6]. These mushrooms have been utilized for generations in various traditional remedies. By validating and expanding upon this knowledge through scientific research, we bridge the gap between traditional wisdom and modern science. The potential therapeutic applications of certain mushrooms, particularly in mental health, warrant further investigation. However, it's essential to approach such research with ethical considerations and a comprehensive understanding of local cultural practices.

The identification of edible and economically valuable mushrooms offers opportunities for sustainable livelihoods and economic development [2,4]. Cultivation of edible species such as Pleurotus can provide a source of nutrition and income for local communities [4]. Additionally, the pharmaceutical industry can benefit from the discovery of bioactive compounds within medicinal mushrooms [9]. Integrating mushroom-related activities into eco-tourism initiatives can also generate revenue and raise awareness about the importance of biodiversity conservation [31]. While our study provides valuable insights into mushroom diversity and economic potential in the Eastern Ghats, further research is warranted. Long-term monitoring of mushroom populations, in-depth molecular analyses, and comprehensive ecological studies can enhance our understanding of these fungal communities [7,17,27]. Additionally, collaboration with local communities is essential to ensure the sustainable utilization of mushroom resources and the preservation of traditional knowledge [5,24]. In conclusion, our study sheds light on the rich mushroom diversity within the Eastern Ghats and its economic significance. The identified mushrooms have ecological roles, offer potential therapeutic benefits, and contribute to sustainable livelihoods. Our findings emphasize the need for conservation efforts, scientific exploration, and cultural preservation to ensure the holistic well-being of both the ecosystem and the communities that inhabit it.

Summary

The study conducted a comprehensive screening of mushrooms in the soil of the Eastern Ghats region, covering Visakhapatnam, Paderu, Minimuluru, and Vanjangi areas. The Eastern Ghats are renowned for their biodiversity, and mushrooms, with their ecological and economic importance, were the focal point of this research. Through extensive field surveys, mushroom samples were collected from various habitats, such as forests, grasslands, and agricultural lands. Accurate species identification was ensured by combining morphological characteristics and advanced molecular techniques [2,7,17,27]. The investigation unveiled a diverse range of mushroom species in the region, belonging to genera like *Agrocyve, Agaricus, Psilocybe, Panaeolus, Agrocybe, Coprinopsis, Lentinellus, Daedaleopsis, Ganoderme, Coprinellus*. These mushrooms exhibited distinctive features such as cap shapes, colours, gill patterns, and stem characteristics [2]. Molecular analysis provided deeper insights into their genetic diversity and relationships [7,17].

Significantly, several mushrooms stood out for their economic importance. Edible species like *Pleurotus* were identified, offering nutritional value and cultivation potential. Additionally, certain mushrooms possessed medicinal properties, aligning with traditional uses by local communities [3,6,13]. The study's contribution lies in its documentation of mushroom diversity within the Eastern Ghats, emphasizing their ecological value. This highlights the need for conservation measures to protect these fungi and their habitats [18, 25]. The discovery of edible and medicinal species presents opportunities for sustainable livelihoods and medical research [2,4] . To sum up, the research shed light on mushroom diversity in the Eastern Ghats' soil across Visakhapatnam, Paderu, Minimuluru, and Vanjangi regions. The findings underscored their significance in terms of biodiversity, potential applications, and conservation strategies in this ecologically crucial area [2,7,17,18,25].

Conclusion

In conclusion, the comprehensive study focused on mushroom diversity and economic potential in the Eastern Ghats region, specifically within the Visakhapatnam area, Paderu Mandal, Minimuluru, and Vanjangi localities. The research highlighted the vital role that mushrooms play within the ecosystem, underscoring their significance as decomposers and agents of nutrient cycling [10,20]. This investigation brought to the forefront the unique biodiversity of the Eastern Ghats and shed light on the immense potential these fungi hold for various applications [7,13]. Through extensive field surveys, the study successfully collected a diverse array of mushroom samples from different habitats, including forests, grasslands, and agricultural lands [2,7,19,27]. The meticulous use of both morphological and molecular techniques for species identification ensured accuracy and reliability in the results [2,7,17,27]. The diversity was particularly evident in the identification of genera such as *Agrocyve, Agaricus, Psilocybe, Panaeolus, Agrocybe, Coprinopsis, Lentinellus, Daedaleopsis, Ganoderme, Coprinellus* each boasting distinctive features and characteristics [2]. One of the study's key findings was the economic significance of certain mushroom species. Edible varieties like Pleurotus presented themselves as not only a potential nutritional resource but also a candidate for cultivation, offering opportunities for both subsistence and commercial activities [2,4,6].

Additionally, the presence of mushrooms with medicinal properties highlighted the importance of traditional knowledge held by local communities and the potential for these species to contribute to pharmacological research [3,6,22]. The research extended its scope to encompass soil parameters in Vanjangi and Minimuluru areas. The variations in moisture, nitrogen, potassium, and other elements further underlined the intricate relationship between soil conditions and the growth of diverse mushroom species [16]. This understanding could play a crucial role in devising strategies for sustainable cultivation and conservation. In essence, the study's findings emphasize the need for conservation efforts aimed at preserving the rich mushroom diversity of the Eastern Ghats[18,25,38]. By documenting these fungal resources and their habitats, the research not only contributes to our understanding of the region's ecosystem but also highlights the potential for sustainable economic activities [18,25,31]. The linkage between traditional knowledge, modern science, and economic development provides a roadmap for fostering harmony between human activities and the environment[8,25,38]. As the Eastern Ghats face ongoing environmental changes, this study serves as a valuable baseline for future research, enabling scientists, conservationists, and policymakers to make informed decisions about the region's ecological preservation and economic prosperity [1,18,25,32]. Ultimately, the exploration of mushroom diversity in this unique ecosystem has illuminated the intricate connections between nature, culture, and human well-being, pointing towards a balanced and sustainable future [8,21,32].

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