**ABSTRACT**

**Aims:** Rairangpur forest division, Mayurbhanj, Odisha is a hub of diverse floral and faunal species. Apart from flora and fauna, it has a rich diversity of fungal species. The present study highlights the diversity of macro fungi with special reference to its medicinal and economic values available in Rairangpur Forest Division, Odisha.

**Place and Duration of Study:** Field surveys were carried out at regular intervals (Pre monsoon and Post monsoon) in Rairangpur Forest Division during 2019-2020.

**Results:** Mushroom samples were collected and then identified with the help of standard available literatures and books. 99 wild mushroom species belonging to 56 genera of 37 families were noted.

**Conclusion:** It was found that 41 species were edible in which 15 mushrooms were consumed by...
Mushrooms is, Celastrus -od and nutraceutical among theous-oms flourish- ion [8]. They are rich in-tant role in ecological processes. A-copper and potassium and dietary fiber chitin and minerals like magnesium, selenium, phosphorus, vitamin B and vitamin C. They are also used for-leucine and an excellent source of vitamins like- amino acids that are especially rich in lysine and-Mushroom protein contains all the essential-flavonoids, nucleotides and their derivatives [9].-terpenoids, steroids, phenolic compound-they also contain bioactive compounds such as-fatty acids, terpenoids, peptides, protein, amino-polysaccharides, oligosaccharides, unsaturated-exists in tropical reg-world. One third of total global fungal diversity-occur seasonally in several habitats all over the-world [7]. Mushrooms are cosmopolitan in nature and are quite specific in-their nutritional and ecological requirements. These are the richest and most diverse group in-the world [2]. Micro fungi play a vital role in-biodegradation and bio-deterioration [3]. Mushroom plays important role in ecological processes. A-good information is embedded as traditional-knowledge with the indigenous tribal people with-regard to mushrooms and the forest ecosystem. They are also aware of the wild edible and non-edible mushrooms [4]. Such mushrooms flourish-the forest floor well in the rainy season. Mushrooms are fleshy, spore bearing fruiting-body of a fungus and are the major biological constituent in forest ecosystem [5]. From-the ancient time wild mushrooms have been fulfilling-the need of food and nutraceutical among the-aboriginals. There are about 15,00,000 fungi present all over the world in which 14,000 are-recognized as mushroom species, among these 1154 mushrooms are reported as edible [6]. Total 140,000 mushroom species have been-reported till date and among them 700 species are-palatable with many therapeutic properties-[7]. Mushrooms are cosmopolitan in nature and occur-seasonally in several habitats all over the-world. One third of total global fungal diversity-exists in tropical region [8]. They are rich in-polysaccharides, oligosaccharides, unsaturated-fatty acids, terpenoids, peptides, protein, amino-acids and minerals element. In addition to this-they also contain bioactive compounds such as-terpenoids, steroids, phenolic compound, flavonoids, nucleotides and their derivatives [9]. Mushroom protein contains all the essential amino acids that are especially rich in lysine and-leucine and an excellent source of vitamins like-vitamin B and vitamin C. They are also used for-preparing alcohol beverage. They are also rich in-minerals like magnesium, selenium, phosphorus, copper and potassium and dietary fiber chitin and-B glucagon. The most cultivated edible-mushroom worldwide is Agaricus bisporus-(common mushroom) followed by Lentinus edodes (Shiitake mushroom), Pleurotus spp. (in-particular Oyster mushroom), and Flammulina velutipes (Enoki mushroom). Now a days many-organic pollutants are decomposed by-mushrooms such as Trametes versicolor [10-11].

1. INTRODUCTION

Mushroom belongs to the group of organisms known as Macrofungi which falls under phylum Ascomycotina and Basidiomycotina. Mushrooms lack chlorophylls and so they cannot prepare their own food. They get their nutrition from dead and decaying organic substances or living plant and animal, so they have saprophytic or parasitic or symbiotic mode of nutrition [1]. Fungi are heterotrophic in nature and they are quite specific in-theseir nutritional and ecological requirements. These are the richest and most diverse group in-the world [2]. Micro fungi play a vital role in biodegradation and bio-deterioration [3]. Mushroom plays important role in ecological processes. A good information is embedded as traditional knowledge with the indigenous tribal people with regard to mushrooms and the forest ecosystem. They are also aware of the wild edible and non-edible mushrooms [4]. Such mushrooms flourish the forest floor well in the rainy season. Mushrooms are fleshy, spore bearing fruiting body of a fungus and are the major biological constituent in forest ecosystem [5]. From the ancient time wild mushrooms have been fulfilling the need of food and nutraceutical among the aboriginals. There are about 15,00,000 fungi present all over the world in which 14,000 are recognized as mushroom species, among these 1154 mushrooms are reported as edible [6]. Total 140,000 mushroom species have been reported till date and among them 700 species are palatable with many therapeutic properties [7]. Mushrooms are cosmopolitan in nature and occur seasonally in several habitats all over the world. One third of total global fungal diversity exists in tropical region [8]. They are rich in polysaccharides, oligosaccharides, unsaturated fatty acids, terpenoids, peptides, protein, amino acids and minerals element. In addition to this they also contain bioactive compounds such as terpenoids, steroids, phenolic compound, flavonoids, nucleotides and their derivatives [9]. Mushroom protein contains all the essential amino acids that are especially rich in lysine and leucine and an excellent source of vitamins like vitamin B and vitamin C. They are also used for preparing alcohol beverage. They are also rich in minerals like magnesium, selenium, phosphorus, copper and potassium and dietary fiber chitin and B glucagon. The most cultivated edible mushroom worldwide is Agaricus bisporus (common mushroom) followed by Lentinus edodes (Shiitake mushroom), Pleurotus spp. (in particular Oyster mushroom), and Flammulina velutipes (Enoki mushroom). Now a days many organic pollutants are decomposed by mushrooms such as Trametes versicolor [10-11].

2. MATERIALS AND METHODS

2.1 Study Area

Rairangpur is situated at Mayurbhanj district of Odisha, between 22°16ˈ45̎ N and 86°11ˈ45̎ E. It has an average elevation of 248 m with an annual average temperature of (35-35) °C. The region receives total annual average rainfall of about 695 mm [12]. Ho, Santal, Mankadia, Bhui, Bathudi, Munda are the main tribal communities of this region. It is also surrounded by hills and Mining areas. Geographically it enjoys Dry Deciduous, Moist Deciduous and especially Sal forest. The most frequent flora of the study areas are Shorea robusta, Cassia fistula, Diospyros melanoxylon, Alangium salvifolium, Terminalia alata, Terminalia bellirica, Terminalia arjuna, Cipadessa baccifera, Cryptolepis buchanani, Careya arborea, Butea monosperma, Ougeinia oojeinens, Cryptolepis buchanani, Careya arborea, Butea monosperma, Ougeinia oojeinens, Celastrus paniculatus, Madhuca longifolia, Holarhenna pubescens, Smilax zeylanica, Schleichera oleosa, Haldina cordifolia etc [13]. Many types of Orchids are present in Rairangpur like Vanda tessellata, Acampe praemorsa, Acampe carinata, Aerides odorata, Hebenaria commelinifolia etc which makes the forest charming and beautiful. The forest enjoys some parasitic plants like Viscum articulatum, Drosera burmannii, Utricularia aurea, Utricularia caerulea etc.

2.2 Collection of Medicinal Values

The survey was made during the year 2020-2021 and photographed the samples was taken for easy identification using publish Research paper and books [14-17]. The regular field trips were
carried out in different places of Rairangpur Forest Division (Badampahar, Suleipat, Bangiriposi Ghati, Sanajhili, Badajhili, Jhiliondungri, Biso etc). The local communities, tribal’s, forest watcher of Rairangpur forest division confirm the food and medicinal values of wild edible Mushrooms. The ethnobotanical survey was done by Team APRF. From the survey information were collected regarding the edibility, medicinal value and nutraceutical values of mushroom from the villagers. Rairangpur is rich in resource of edible mushroom, which grow wild in forest and grassland (Plate 2).

3. RESULTS

A total of 99 mushroom species belonging to 56 genera of 37 families were identified from Rairangpur Forest Division during survey. Table 1 represents the list of collected mushroom species during the survey period. Family Agaricaceae and Polyphoraceae (11 species) was reported the most dominant while Russulaceae (8 species), Marasmiaceae (7 species), Amanitaceae (5 species), Lyophyllaceae (5 species), Xylariaceae (5 species), Hymenochaetaceae (4 species), Ganodermataceae (4 species), Clavariaceae (3 species), Mycenaceae (3 species), Hygrophanaceae (3 species), Auriculariaceae (2 species), Geastraceae (2 species), Gomphaceae (2 species), Leptotubaeceae (2 species), Psathyrellaceae (2 species), Pluteaceae (2 species), and Bolbitiaceae, Coniophoraceae, Dacrymycetaceae, Entolomataceae, Fomitopsidaceae, Helotiaceae, Hydnangiaceae, Meripilaceae, Meruliaceae, Peniophoraceae, Pleurotaceae, Pyronemataceae, Schizophyllaceae, Sclerodermafragae, Sillaceae, Strochriaceae, Stereaceae, Tricholomataceae, Tuberafragae have contains only one species (Fig 1). During field and ethnobotanical survey 41 species of mushrooms were reported as edible. The most common edible mushrooms are Amanita caesarea, Clavaria amoena, Lactarius resimus, Leucocoprinus cepesitapes, Lactarius resimus, Macrolepiota dolicha, Microporus xanthopus, Russula nigricans, Termitomyces cylpeatus, Tuber rufum, Volvariella volvaceae, T. heimii, T. microcarpus, R. rosea, R. xerampelina, Schizophyllum commune., Among them Agaricus campestris, Tuber rufum, Volvariella volvaceae are considered highly delicious. During survey some medicinal mushrooms are observed which are used by tribal and local communities, these are Ganoderma, Agaricus, Auricularia, Trametes etc. Ganoderma tsugae is used to boost immune system, induce sleeping and to reduce cholesterol level. According to them Agaricus species has anti-ageing activity. Volvorella volvacea used to lower blood pressure, Lycoperdon pyriformi used to cure wound and Termitomyces microcarpus used for curing rheumatism and diarrhoea. Local tribal communities collect wild medicinal mushrooms species like Ganoderma, Auricularia, Trametes and sold the traders for their livelihood. They used Auricularia auricular to cure various stomach disease and Pycnopoporous cinnabarinus to cure wounds (Plate 1).
Table 1. Wild mushroom diversity of Rairangpur forest division, Odisha, India

| Botanical Name                  | Family          | Class                  | Edibility     |
|--------------------------------|-----------------|------------------------|---------------|
| Agaricus campestris            | Agaricaceae     | Agaricomycetes         | Edible        |
| Agaricus trisulpharatus        | Agaricaceae     | Agaricomycetes         | Non-edible    |
| Aleuria aurantia               | Pyronemataceae  | Pezizomycetes          | Non-edible    |
| Amanita australis              | Amanitaceae     | Agaricomycetes         | Edible        |
| Amanita caesarea               | Amanitaceae     | Agaricomycetes         | Edible        |
| Amanita loossii                | Amanitaceae     | Agaricomycetes         | Edible        |
| Amanita ovalispora             | Amanitaceae     | Agaricomycetes         | Non-edible    |
| Amanita vaginata               | Amanitaceae     | Agaricomycetes         | Non-edible    |
| Auricularia auricular-judae    | Auriculariaceae | Agaricomycetes         | Edible        |
| Bjerkandera citrinea           | Helotiaceae     | Leotiomycetes          | Non-edible    |
| Clavaria amoena                | Clavariaceae    | Agaricomycetes         | Edible        |
| Clavaria vermicularis          | Clavariaceae    | Agaricomycetes         | Edible        |
| Clavulinopsis aurantiocinnaabarina | Clavariaceae | Basidiomycetes        | Non-edible    |
| Coltricia cinnamomia           | Hymenochaetaceae| Agaricomycetes         | Non-edible    |
| Coniophora puteana             | Coniophoraceae  | Agaricomycetes         | Non-edible    |
| Conocybe apala                 | Bolbitiaceae    | Agaricomycetes         | Non-edible    |
| Coprinus disseminates          | Psathyrellaceae | Agaricomycetes         | Non-edible    |
| Dacryopinax spathularia        | Dacrymycetaceae | Dacrymycetes           | Non-edible    |
| Daldinia concentrica           | Xylariaceae     | Sordariomycetes        | Non-edible    |
| Entoloma sinuatum              | Entolomataceae  | Agaricomycetes         | Non-edible    |
| Fomitopsis pinicola            | Fomitopsiaceae  | Agaricomycetes         | Non-edible    |
| Ganoderma austrole             | Ganodermataceae | Agaricomycetes         | Non-edible    |
| Ganoderma lucidum              | Ganodermataceae | Agaricomycetes         | Non-edible    |
| Ganoderma tsugae               | Ganodermataceae | Agaricomycetes         | Edible        |
| Geastrum fimbriatum            | Geastraceae     | Agaricomycetes         | Edible        |
| Geastrum sacculatum            | Geastraceae     | Agaricomycetes         | Edible        |
| Gomphus floccosus              | Gomphaceae      | Agaricomycetes         | Non-edible    |
| Grifola frondosa               | Meripilaceae    | Agaricomycetes         | Edible        |
| Hirneola auricular             | Auriculariaceae | Agaricomycetes         | Edible        |
| Hygrocybe aurantiosplendens    | Hygrophoraceae  | Agaricomycetes         | Non-edible    |
| Hygrocybe cantharelius         | Hygrophoraceae  | Agaricomycetes         | Non-edible    |
| Hygrocybe russocoriacea        | Hygrophoraceae  | Agaricomycetes         | Non-edible    |
| Laccaria fraterna              | Hydnangiaceae   | Agaricomycetes         | Non-edible    |
| Lactarius deliciosus           | Russulaceae     | Agaricomycetes         | Edible        |
| Lactarius resimus              | Russulaceae     | Agaricomycetes         | Edible        |
| Langermannia gigantean         | Agaricaceae     | Agaricomycetes         | Edible        |
| Lentinus fusipes               | Polyporaceae    | Agaricomycetes         | Edible        |
| Lentinus torulosus             | Polyporaceae    | Agaricomycetes         | Edible        |
| Lentinus tubergium             | Pleurotaceae    | Agaricomycetes         | Edible        |
| Lenzites betulina              | Polyporaceae    | Basidiomycetes         | Non-edible    |
| Lepiota clupeolaria            | Agaricaceae     | Agaricomycetes         | Non-edible    |
| Lepiota cristata               | Agaricaceae     | Agaricomycetes         | Non-edible    |
| Leucocoprinus brebiissonii     | Agaricaceae     | Agaricomycetes         | Non-edible    |
| Leucocoprinus cepetipes         | Agaricaceae     | Agaricomycetes         | Non-edible    |
| Leucocoprinus cretceus          | Agaricaceae     | Agaricomycetes         | Non-edible    |
| Lycoperdon perlatum            | Agaricaceae     | Agaricomycetes         | Edible        |
| Lycoperdon pyriformi           | Agaricaceae     | Agaricomycetes         | Edible        |
| Macrolepiota clelandii         | Lepiotaceae     | Agaricomycetes         | Edible        |
| Botanical Name                  | Family               | Class            | Edibility   |
|--------------------------------|----------------------|------------------|-------------|
| Macrolepiota dolichaula        | Lepiotaaceae         | Agaricomycetes   | Edible      |
| Macrolepiota procera           | Agaricaceae          | Agaricomycetes   | Edible      |
| Marasmius anomalous            | Marasmiaceae         | Agaricomycetes   | Edible      |
| Marasmius capillaris           | Marasmiaceae         | Agaricomycetes   | Edible      |
| Marasmius elegans              | Marasmiaceae         | Agaricomycetes   | Non-edible  |
| Marasmius haematocephalus      | Marasmiaceae         | Agaricomycetes   | Non-edible  |
| Marasmius plicatulus           | Marasmiaceae         | Agaricomycetes   | Non-edible  |
| Marasmius rotula               | Marasmiaceae         | Agaricomycetes   | Non-edible  |
| Marasmius siccus               | Marasmiaceae         | Agaricomycetes   | Non-edible  |
| Microporous xanthopus           | Polyporaceae         | Basidiomycetes   | Edible      |
| Mycena acicula                 | Mycenaceae           | Agaricomycetes   | Non-edible  |
| Mycena adscendens              | Mycenaceae           | Agaricomycetes   | Non-edible  |
| Mycena haematopus              | Mycenaceae           | Agaricomycetes   | Non-edible  |
| Nigroporous vinosus             | Sterclerinaceae      | Agaricomycetes   | Non-edible  |
| Parasola conopilus             | Psathyrellaceae      | Agaricomycetes   | Non-edible  |
| Peniophora incarnata           | Peniophoraceae       | Agaricomycetes   | Non-edible  |
| Phellinus gigus                | Hymenochaetaeae      | Agaricomycetes   | Non-edible  |
| Phellinus igniarus             | Hymenochaetaeae      | Agaricomycetes   | Non-edible  |
| Pisolithus arrhizus            | Sclerodermataeae     | Agaricomycetes   | Non-edible  |
| Pluteus lutescens              | Pluteaceae           | Agaricomycetes   | Edible      |
| Polyporous sulphureus           | Polyporaceae         | Agaricomycetes   | Edible      |
| Porodaealae pini               | Hymenochaetaeae      | Basidiomycetes   | Non-edible  |
| Pycnoporus cinnabarinus        | Polyporaceae         | Agaricomycetes   | Non-edible  |
| Pycnoporus sanguineus          | Polyporaceae         | Agaricomycetes   | Non-edible  |
| Ramaria stricta                | Gomphaceae           | Agaricomycetes   | Non-edible  |
| Russula brevipes               | Russulaceae          | Agaricomycetes   | Edible      |
| Russula cyanoxantha            | Russulaceae          | Agaricomycetes   | Edible      |
| Russula emetica                | Russulaceae          | Agaricomycetes   | Non-edible  |
| Russula nigricans              | Russulaceae          | Agaricomycetes   | Edible      |
| Russula rosea                  | Russulaceae          | Agaricomycetes   | Edible      |
| Russula xerampelina            | Russulaceae          | Agaricomycetes   | Edible      |
| Schizophyllum commune           | Schizophyllaceae     | Agaricomycetes   | Non-edible  |
| Suillus luteus                 | Sillaceae            | Agaricomycetes   | Edible      |
| Termitomyces clypeatus          | Lyophyllaceae        | Agaricomycetes   | Edible      |
| Termitomyces eurrhizus          | Lyophyllaceae        | Agaricomycetes   | Edible      |
| Termitomyces heimii            | Lyophyllaceae        | Agaricomycetes   | Edible      |
| Termitomyces medicus           | Lyophyllaceae        | Agaricomycetes   | Edible      |
| Termitomyces microcarpus        | Lyophyllaceae        | Agaricomycetes   | Edible      |
| Trametes elegans               | Polyporaceae         | Agaricomycetes   | Non-edible  |
| Trametes gibbosa                | Polyporaceae         | Agaricomycetes   | Non-edible  |
| Trametes sanquinea              | Polyporaceae         | Agaricomycetes   | Non – edible|
| Trametes versicolor             | Polyporaceae         | Agaricomycetes   | Non-edible  |
| Tricholoma lobayense            | Tricholomataeae      | Agaricomycetes   | Edible      |
| Tuber rufum                    | Tuberaceae           | Pezizymyces      | Edible      |
| Volvariella volvacea            | Pluteaceae           | Agaricomycetes   | Edible      |
| Xylaria cubensis               | Xylariaceae          | Sordariomycetes  | Non-edible  |
| Xylaria filiformis             | Xylariaceae          | Sordariomycetes  | Non-edible  |
| Xylaria hypoxylon              | Xylariaceae          | Sordariomycetes  | Non-edible  |
| Xylaria longipes               | Xylariaceae          | Sordariomycetes  | Non-edible  |
| Xylobolous subpileatus         | Stereaceae           | Agaricomycetes   | Non-edible  |
Plate 1. Mushroom diversity in study area; a) *Lycoperdon pyriforme*, b) *Daldinia concentrica*, c) *Microcarpus xanthopus*, d) *Russula emetic*, e) *Tuber rufum*, f) *Schizophyllum commune*

Plate 2. Mushroom diversity in study area; g) *Clavaria vermicularis*, h) *Marasmius haematocephala*, i) *Geastrum fimbriatum*, j) *Russula rosea*, k) *Macropleiotra procera*, l) *Russula cyanoxantha*
Plate 3. Mushroom diversity in study area; m) Amanita ovalispora, n) Lentinus fuscipes, o) Ganoderma lucidum, p) Microporous xanthopus, q) Dacryopinax spathularia, r) Trametes sanguine

Plate 4. Field survey for the documentation of mushroom diversity
4. DISCUSSION

Mushrooms are diverse organisms which play a vital role in maintaining forest ecosystem and biodiversity. Odisha, with its diverse landscapes provides fertile platform for wild mushroom diversity. Earlier 11 mushrooms are reported from Odisha state which are edible [18]. These are Amanita caeserea, T. heimii, T. eurrhizus, A. loosi, Termitomyces microcarpus, T. clypeatus, Tuber rufum, Russula lepida, R. brevipes, Lentinus fusipes and Microporus xanthopus. Later in 2013 Sachan et al. reported 14 edible mushroom species from Similipal Biosphere Reserve [19]. Panda et al. in 2019 were reported about 20 edible mushroom species like Lycoperdon pyriforme, Lycoperdon pyriformi, Volvariella volvacea, Amanita egregia, Termitomyces microcarpus, Termitomyces eurhizus, Termitomyces heimii, Russula rosea etc. from Northern Odisha, India [6]. Recently in 2020 Rout et al. reported 60 wild mushroom from Dhenkanal district of Odisha in which 20 mushrooms are edible [7].

5. CONCLUSION

Rairangpur Forest Division with its varied topography and diverse vegetation enjoys a rich diversity of mushrooms in wild habitats. This region is rich in resources of edible macrofungi. A total of 99 mushroom species belonging to 56 genera of 37 families were identified from Rairangpur Forest Division during survey and it was found that 41 species were edible in which 15 mushrooms were consumed by local and tribal communities. The rest species are poisonous or bitter in taste and further research on them could lead to isolate some bioactive compounds which could be a better preventive against many lethal diseases. The above results provide more scopes to identify the edible and non-edible mushrooms for future food and medicines. Therefore it is very important to explore, document and conserve these natural wealth.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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