DYE YIELDING MUSHROOMS FROM AMRAVATI- MELGHAT REGION

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Abstract: Dye is a substance which is used to impart colour to various substrates. The dyeing is not readily altered by washing, heat, light or other factors. Mushrooms can be used to create colour dyes via colour extraction with a solvent as well as particulation of raw material. Many mushrooms contain pigments which will make a good lightfast and colour fast dye. Some mushrooms may be used to dye wool, textiles, paper, leather and other materials. Some simple natural mordants/ modifiers like salt water, vinegar, ammonia, a copper pot and a rusty iron pot are used by some dye makers.

To study the diversity of macromycetes in Amravati region, extensive surveys were undertaken in last ten years. During study along with edible, non-edible, medicinal mushrooms; some of the very precious dye yielding mushrooms were collected and studied. Following are some colourful and beautiful forms; from which dyes may be produced. Grey-green dye is extracted by using Grey Oyster Mushroom (Pleurotus ostreatus) and Shaggy ink cap (Coprinus comatus). Dye ball (Pisolithus tinctorius) and Turkey Tail (Trametes versicolor) is the source for brown dye. Rusty dye is extracted from Reishi (Ganoderma lucidum) and Artist’s bracket (Ganoderma applanatum). Purple-spored puffball (Calvatia cyathiformis) is the source for rust-red dye. Field mushroom (Agaricus campestris) is used to produce yellow-tan colour. Horse Mushroom (Agaricus arvensis) is used to extract yellow-tan dye, while pink beige deeper tones are extracted from Lepiota americana.

Index Terms: Mushroom survey, Amravati- Melghat region, Dye yielding mushrooms.

I. INTRODUCTION

India is a rich treasure of natural resources and mushrooms is one of them. Amravati is endowed with Satpuda ranges. Due to suitable geographical and favourable climatic conditions, wide and rich mycoflora is hidden in this region. Studies on wild macromycetes with special reference to their edibility, utility, dyeing properties and medicinal value with the early references may be beneficial for society. Collecting larger fungi should not be considered a haphazard pursuit. It is to emphasize that the task of identification and proper record of larger fungi is of prime importance and can only be fulfilled by extensive surveys of different zones of the country.

II. REVIEW OF LITERATURE

Some wild edible mushrooms were reported from South-West India by Sathe and Kulkarni (1987). The mushroom flora of Kerala investigated by Devi and Nair (1988). Many Agarics were reported from Andhra Pradesh by Manoharachary and Vijay Gopal (1991). From several bio-geographical regions of India, at least 2000 edible species of larger fungi were reported. But Central India region has not been investigated extensively for mushroom flora (Kaul, 1999). A list of 37 wild mushroom species of Sundarijal and Kathmandu region is published by Pandey and Budhathoki, 2008.
III. MATERIALS AND METHODS

Healthy specimens were collected from forests of Melghat and Pohara including the forest nurseries of Amravati and Tapovaneshwar. They were cleaned and brought to the laboratory. Standard techniques for collection, preservation and description have been followed (Atri and Saini 2000). Morphological observations were based on fresh specimens. The microscopic observations and spore prints were made immediately after collection (Kaul 1999). Colour terminology used is that of Kornerup and Wanscher (1967). The specimens were deposited in the Botany Museum, P.G. Department of Botany, Amravati, India.

Identification, edibility and medicinal properties were noted by referring the standard literature (Atkinson, 1961; Lange and Hora, 1981; Purkayastha and Chandra, 1985; Patil et. al., 1995; Swanton, 2002; Rai et al, 2005).

IV. RESULTS AND DISCUSSION

Description of collected mushrooms were studied as follows-

1. *Agaricus campestris* L. ex Fr. (Field mushroom)

   Sporophores- Solitary, stipitate, white when young. Pileus- 4.0-8.0 cm. in diameter first rounded, then convex and more or less flattened at maturity, sometimes with light brown triangular scales towards centre of cap. Gills-crowded, distinctly formed, free from stem, at first white then pink and finally purple brown. Stipe- central, cylindrical, 5.0 - 8.0 cm. long, 8 – 12 mm. in thickness, white and fleshy. Annulus- single, white. Flesh- white, firm. Basidiospores- purple brown, spherical to ellipsoidal.

   Collected from- S.G.B. University campus, amongst grass, by roadsides, Tapovan.

2. *Agaricus arvensis* Scaeff.ex. Secr. (Horse Mushroom)

   Sporophores- Solitary or scattered in grassy pastures or meadows, centrally stipitate. Pileus- 7.0-13.0 cm wide, convex or flattened, white when young and pale yellow when old, surface sometimes covered with flat scales. Gills-crowded, free, white when young, then greyish-pink and finally blackish brown. Stipe-cylindrical, central, 5.0-13.0 cm long, white, smooth, hollow and bulbous. Annulus- large, thick, double. Flesh- white first, later becomes yellowish. Spores-purplish brown, ellipsoid to avoid.

   Collected from: Rahatgaon on grassy land

3. *Lepiota americana* Peck

   Sporophores- on grassy land sometimes on old stumps. Pileus- 2.5-10.0 cm in diameter, ovate when young, becoming convex or expanded with an umbo, surface usually white but the umbonal region with reddish brown scales. Gills- crowded, white, free Stipe- initially white but brownish red with age, thickened downwards, annulus thin but thick at the border, quickly disappearing. Spores-creamish white, sub-elliptical.

   Collected from: Yogiraj Nagar field.

4. *Pleurotus ostreatus* (Jacquin exFr.) Kummer (Oyster mushroom)

   Sporophores- growing in clusters on dead tree trunks. Pileus-8.0-20.0 cm or more broad, spatulate to kidney shaped, white grey or sometimes yellowish after drying, margin incurved. Gills- crowded, decurrent, anastomosing at the base, white to yellowish. Stipe- eccentric, 1.0-3.0 cm long. Flesh- white, soft, spongy. Taste and smell pleasant. Basidiospores- white, oblong.

   Collected from: Wadali forest nursery on *Ficus* tree trunk.

5. *Coprinus comatus* (Muell ex Fr.) S. F. Grey (Shaggy ink caps)

   Sporophores- singly or in clumps on compost, refuse dumps. Pileus- 5.0–10.0 cm. long (before expansion), oblong, comanulate, fleshy, fragile, white, covered with woolly, shaggy scales, the center smooth and yellowish-brown, whitish between the scales, the margin becomes pinkish then black as autodigestion proceeds. Stipe- central,
tapering at the top, smooth, hollow, 12.5-17.5 cm. long and 10-12 mm thick. Gills- at first white, then pink and finally black, deliquising into an inky fluid. Spores- black. Common on rich ground, road-sides.

Collected from: Wadali road, College campus, on dung rich grassy land, Shivaji Agriculture college on compost, S.G.B. Amravati University on compost.


Sporophores- growing solitary or scattered on the ground, in meadows, grassy lands, pear-shaped, rounded above and tapering below to the stout base, 6.0-12.0 cm. high. Peridium- 5.0-12.0 cm. wide, white when young, pinkish or brownish when old, surface covered with warty patches. Gleba- white when young and purplish at maturity, wall cracking into irregular fragments and purplish mass of the spores is exposed. Capillitium and Spores-purple-brown. Old sterile cup-like bases of sporophore are often found in the field after spore dispersal. Basidiospores- round, purple brown.

Collected from: Tapovan Goshala, on grassland.

7. *Pisolithus tinctorius* (Micheli ex Persoon) Coker & Couch (*Warted devil’s snuff box*)

Sporophores- growing solitary on grassy sandy soils. 10-18 cm. tall, rounded above with stout rooting base. Peridium- 8-10 cm. in diameter, whitish and smooth when young, brown when mature and breaking away irregularly from the apex. Gleba- divided into polygonal cavities by the persistent tramal plates; chambers occupied by spore mass without capillitium. Spores- globose, ochraceous to umber.

Collected from: Tapovan, SGB Amravati Univ. Campus, Melghat forest in association with *Eucalyptus* trees.

8. *Trametes versicolor* (*Turkey Tail*)

On stumps, branches of frondose trees. On felled, rarely on structural timber. Thin brackets, upper surface with silky-velvety, with usually multicoloured concentric zones, 3-5 cm across, often in long, tiered rows, colours variable, brown, greyish, yellow, near black, tubes very short, pores white to dirty yellowish. Flesh- thin, tough, thinner at wavy margins.

Collected from: Chikhaldara, Pohara forest, SGB Amravati University on trees trunks.

9. *Ganoderma lucidum* (*Reishi*)

On stumps of frondose trees. Laterally stipitate reniform cap, whole fungus enclosed in hard shining, laccate, dark chestnut crust. The purplish-black colour of the plate is exceptional. Cap - 5-20 cm. wide, sometimes with circular or ligulate, concentrically sulcate, pores off-white, finally dull brown, minute. Flesh- corky-fibrous. Spores-brown.

Collected from: Tapovan, Melghat, SGB Amravati University, Pohara forest, Tapovaneshwar, Shri Shivaji Science College, Amravati on stumps off frondose trees.

10. *Ganoderma applanatum* (*Artist’s Conk*)

On trunks of frondose trees especially on ageing beeches, where it causes a serious and damaging heart rot. Bracket-like upper surface with low humps formed from hard laccate crust with red-brown, often cocoa-brown from deposited spores, whitish pores brown when scratched. Caps- 5-30 cm across with flat, solitary or a few caps overlapping, zoned, humps with radial, margin paler at first, rounded, pores finally ageing brown, tubes often stratified. Flesh- brown, corky-hard, thick. Spores- cocoa-brown.

Collected from: SGB Amravati University, Pohara forest, GVISH Campus on stumps off frondose trees.
Many mushrooms may be used to dye some fabrics, wool and other fibres. Below is a chart of mushroom species showing results of colour produced by using different mordants/ modifiers.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Mushroom species</th>
<th>Mordant/Modifier</th>
<th>Colour produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agaricus campestris (Field mushroom)</td>
<td>Salt water/Iron pot</td>
<td>Yellow-tan</td>
</tr>
<tr>
<td>2</td>
<td>Agaricus arvensis (Horse Mushroom)</td>
<td>Salt water/Iron pot</td>
<td>Yellow-tan</td>
</tr>
<tr>
<td>3</td>
<td>Lepiota americana</td>
<td>Salt water/Ammonia</td>
<td>Pink beige</td>
</tr>
<tr>
<td>4</td>
<td>Pleurotus ostreatus (Oyster mushroom)</td>
<td>Ammonia/Iron pot</td>
<td>Grey-green</td>
</tr>
<tr>
<td>5</td>
<td>Coprinus comatus (Shaggy ink caps)</td>
<td>Ammonia/Iron pot</td>
<td>Bayberry grey-green</td>
</tr>
<tr>
<td>6</td>
<td>Calvatia cyathiformis (Purple spored puffball)</td>
<td>Ammonia</td>
<td>Rust-red</td>
</tr>
<tr>
<td>7</td>
<td>Pisolithus tinctorius (Warted devil’s snuff box)</td>
<td>Ammonia</td>
<td>Brown</td>
</tr>
<tr>
<td>8</td>
<td>Trametes versicolor (Turkey Tail)</td>
<td>Ammonia</td>
<td>Brown</td>
</tr>
<tr>
<td>9</td>
<td>Ganoderma lucidum (Reishi)</td>
<td>Ammonia</td>
<td>Rust</td>
</tr>
<tr>
<td>10</td>
<td>Ganoderma applanatum (Artist’s Conk)</td>
<td>Ammonia</td>
<td>Rust</td>
</tr>
</tbody>
</table>

(Source: www.Mushroom collecting.com (2011))

From several bio-geographical regions of India, at least 2000 edible species of larger fungi were reported. But Central India region has not been investigated extensively for mushroom flora (Kaul, 1999). Hedawoo and Mohite (2008) have reported 15 wild edible mushrooms from Amravati region. Later Hedawoo (2010) recorded 43 species of wild mushrooms belonging to 37 genera. 21 mushroom species were identified as edible, 15 were non-edible and 7 were with medicinal potential. During survey number of mushroom species were added every year, out of that 10 wild mushroom species showed the dyeing properties viz. Agaricus campestris, Agaricus arvensis, Lepiota americana, Pleurotus ostreatus, Coprinus comatus, Calvatia cyathiformis, Pisolithus tinctorius, Trametes versicolor, Ganoderma lucidum and Ganoderma applanatum.

V. CONCLUSION

In future, such wild mushrooms may be used to dye wool, some fabrics and other fibres. Such an extracted dyes are safe, cheap and eco-friendly than other expensive, hazardous chemically synthesized dyes.

VI. REFERENCES

COLLECTED DYE YIELDING MUSHROOMS

Agaricus campestris

Agaricus arvensis

Lepiota americana

Pleurotus ostreatus

Coprinus comatus

Calvatia cyathiformis
Pisolithus tinctorius

Trametes versicolor

Ganoderma applanatum

Ganoderma lucidum