
Biodiversity in higher basidiomycetous fungi of Allahabad

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In this study the basidiomycetous fungi growing in Allahabad and its adjoining areas were collected during the period of 2002 to 2005 recorded and identified. Altogether 18 genera of Hymenomycetes and 4 genera of Gasteromycetes were identified. Most of the fungi were found to grow on soil or under large trees with spreading roots.

Key words: Macrofungi, Hymenomycetes, Gasteromycetes, Allahabad.

INTRODUCTION

A stable and accepted estimate of taxonomic record of fungi is necessary to include fungi in considerations of biodiversity conservation, land-use planning and management (Svrcek, 1988). Allahabad has an area of about 63.07 km² and 98 m above sea level. Allahabad is located at 25.45° N and 81.84° E in the southern part of the Uttar Pradesh at the confluence of the Ganges and Yamuna rivers. To its southwest is the Bundelkhand region, to its east and south east is the Bagelkhand region, to its north and northeast is the Awadh region and to its west is the lower doab of which it is a part. The land of the Allahabad district that falls between the Ganges and Yamuna is just like the rest of Doab, fertile but not too moist. The non-doabi parts of the district, the southern and eastern part of the district are somewhat similar to those of adjoining Bundelkhand and Bagelkhand region, dry and rocky. Allahabad experiences all four seasons. The summer season is from April to June with the maximum temperatures ranging between 40°C to 45°C. Monsoon begins in early July and lasts till September. The winter season falls in the months of December, January and February. Temperatures in the cold weather could drop to freezing with maximum at almost 12°C to 14°C. Allahabad also witnesses severe fog in January. Various workers have investigated mycoflora of Allahabad, from time to time and it is well documented. But the macromycoflora belonging to sub-division Basidiomycotina has scarcely been attempted.

Macrofungi exhibit pattern of diversity, which is largely related to substratum and host availability

and their fruiting is climate driven (Mueller *et al.*, 2004).

Also, the type of vegetation in an area affects the species richness and composition of macrofungi at that site, as all fungi show some degree of host or substratum specificity (Dickinson and Lucas, 1979). Hence the present study has been undertaken to ascertain the occurrence of different basidiomycetous fungi in Allahabad.

MATERIALS AND METHODS

Collection was mainly concentrated in wooded areas of Allahabad. Most collections were carried out in naturally forested areas, gardens and parks. The period from June-September (South West Monsoon) was chosen to coincide with the season under maximum rainfall. The materials used during the survey were pocket lens, pair of scissors, forceps, good knife, preservatives (FAA), labels, pencils, note book to enter the details of the morphological features, the date, locality and habitat of the specimens collected. The macrofungi were collected in polythene bags, before that photographed in nature and brought to the laboratory. They were studied morphologically and anatomically and were identified following standard taxonomic keys for the study of fungi (Christensen, 1961; Hard, 1965; Purkayastha and Chandra, 1985 and Singer, 1986). For morphological studies, place or site of growth of fungus, nature of growth i.e. solitary or part of a group, colour, shape, size, ornamentation etc. were taken into account. For anatomical studies sections were cut and were mounted and observed under microscope.

OBSERVATIONS AND DISCUSSION

During survey conducted from July 2002 to October 2005, large and varied types of macrofungi were encountered. Barring two genera i.e., *Ganoderma* and *Schizophyllum*, the ones belonging to members of Aphyllophorales were not included in the present paper, which mainly comprises of wood decaying fungi. Here mainly the members of Hymenomycetes (order Agaricales) and Gasteromycetes were taken into consideration.

In all 22 genera were recorded, belonging to 18 genera of Hymenomycetes spread into 13 families and 4 genera to Gasteromycetes belonging to three orders were presented in Tables 1 and 2 and represented in Figs. 1-3.

Most of the fungi were found growing on soil or under large trees with spreading roots.

As very little study has been undertaken earlier, except three genera, viz. *Coprinus*, *Ganoderma*,

Table 1. Distribution of macrofungi in years 2002-2005 and their localities

Systematic Position	Genus	Species	Distribution in Years				Localities
			2002	2003	2004	2005	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Hymenomycetes							
Phragmobasidiomycetidae							
Auriculariales							
Auriculariaceae	<i>Auricularia</i>	<i>A. polytricha</i>	+	+	-	-	Company Garden
Homobasidiomycetidae							
Aphylophorales							
Ganodermataceae	<i>Ganoderma</i>	<i>G. lucidum</i>	+	+	+	+	Roxburgh Botanical garden, Company Garden
Schizophyllaceae	<i>Schizophyllum</i>	<i>S. commune</i>	-	+	+	+	Nehru Park, Naini, S.N. Park.
Agaricales							
Agaricaceae	<i>Agaricus</i>	<i>Agaricus</i> sp.	+	+	-	-	R.B. Garden, Medical College Campus
	<i>Lepiota</i>	<i>L. procera</i>	+	+	-	-	Nehru Park, Medical College
	<i>Lepiota</i>	<i>Lepiota</i> sp.	-	-	+	+	Nehru Park, Medical College
	<i>Macrolepiota</i>	<i>M. excoriata</i>	+	+	+	+	R.B. Garden, Medical College Campus
	<i>Mycena</i>	<i>Mycena</i> sp.	-	+	+	-	Naini
Amanitaceae	<i>Amanita</i>	<i>A. phalloides</i>	-	+	+	-	R.B. Garden, Company Garden, Lowther Road
Coprinaceae	<i>Coprinus</i>	<i>Coprinus</i> sp.	-	-	+	+	R.B. Garden, Company Garden A.U.
		<i>Coprinus</i> sp.	-	-	+	+	R.B. Garden, Nehru Park
Cortinariaceae	<i>Inocybe</i>	<i>Inocybe</i> sp.	-	-	+	+	R.B. Garden
Crepidotaceae	<i>Crepidotus</i>	<i>C. varibilis</i>	-	+	+	+	Company Garden, R.B. Garden, Naini
Entolomataceae	<i>Entoloma</i>	<i>Entoloma</i> sp.	-	-	+	-	R.B. Garden, Naini
Russulaceae	<i>Lactarius</i>	<i>L. subdulcis</i>	+	+	-	-	R. B. Garden, Nehru Park, A.U. Road side, S.N. Park
Strophariaceae	<i>Pholiota</i>	<i>P. squarrosa</i>	+	+	-	+	Roxburgh Botanical Garden

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Thelephoraceae	<i>Thelephora</i>	<i>T. anthocephala</i>	-	-	+	+	Naini
	<i>Thelephora</i>	<i>T. regularias</i>	+	+	+	+	Naini
Tricholomataceae	<i>Collybia</i>	<i>C. ollybia</i> sp.	-	+	+	-	Lowther Road
	<i>Lyophyllum</i>	<i>L. connatum</i>	-	+	+	-	R.B. Garden, Company Garden
	<i>Marasmius</i>	<i>Marasmius</i> sp.	+	+	-	-	Church Lane
Gasteromycetes							
Nidulariales							
Nidulariaceae	<i>Cyathus</i>	<i>Cyathus</i> sp.	-	-	-	+	R.B. Garden
Phallales							
Phallaceae	<i>Phallus</i>	<i>P. impudicus</i>	-	-	-	+	R.B. Garden
Lycoperdales							
Geastraceae	<i>Geastrum</i>	<i>G. triplex</i>	-	+	+	+	R.B. Garden, Nehru Park
Lycoperdaceae	<i>Lycoperdon</i>	<i>L. pyriforme</i>	-	+	-	+	R.B. Garden, Nehru Park

Table 2. Distribution of macrofungi in months (July-October), their edibility, poisonous value and other characters

Systematic Position	Genus	Species	Distribution in Months				Frequency	Edible	Poisonous	Any other
			July	Aug.	Sep.	Oct.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Hymenomycetes										
Phragmobasidiomycetidae										
Auriculariales										
Auriculariaceae	<i>Auricularia</i>	<i>A. polytricha</i>	-	+	+	-	++	+	-	-
Homobasidiomycetidae										
Aphylophorales										
Ganodermataceae	<i>Ganoderma</i>	<i>G. lucidum</i>	+	+	+	+	++++	-	-	Wood decay
Schizophyllaceae	<i>Schizophyllum</i>	<i>S. commune</i>	-	+	+	-	+++	-	-	Wood rot,
pathogenic										
Agaricales										
Agaricaceae	<i>Agarius</i>	<i>Agaricer</i> sp.	+	+	-	-	++			Edible
	<i>Lepiota</i>	<i>L. procera</i>	-	-	+	+	++			
	<i>Lepiota</i>	<i>Lepiota</i> sp.	-	+	+	-	++			
	<i>Macrolepiota</i>	<i>M. excoriata</i>	+	+	-	-	++	+	-	Poisonous
	<i>Mycena</i>	<i>Mycena</i> sp.	+	+	-	-	++			
Amanitaceae	<i>Amanita</i>	<i>A. phalloides</i>	-	+	+	-	+++	±	-	
Coprinaceae	<i>Coprinus</i>	<i>Coprinus</i> sp.	-	-	+	-	+	±	-	
	<i>Coprinus</i>	<i>Coprinus</i> sp.	-	-	+	-	+	±	-	
Cortinariaceae	<i>Inocybe</i>	<i>Inocybe</i> sp.	-	+	-	-	+	-	+	
Crepidotaceae	<i>Crepidotus</i>	<i>C. variabilis</i>	+	+	+	-	+++	-	-	
Entolomataceae	<i>Entoloma</i>	<i>Entoloma</i> sp.	-	-	+	-	+			

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fig.1 : A. *Lyophyllum connatum*, B. *Crepidotus variabilis*, C. *Lepiota procera*, D. *Macrolepiota excoriata*, E. *Thelephora anthocephala*, F. *Thelephora regularias*, G. *Auricularia polytricha*, H. *Lactarius subdulcis*.

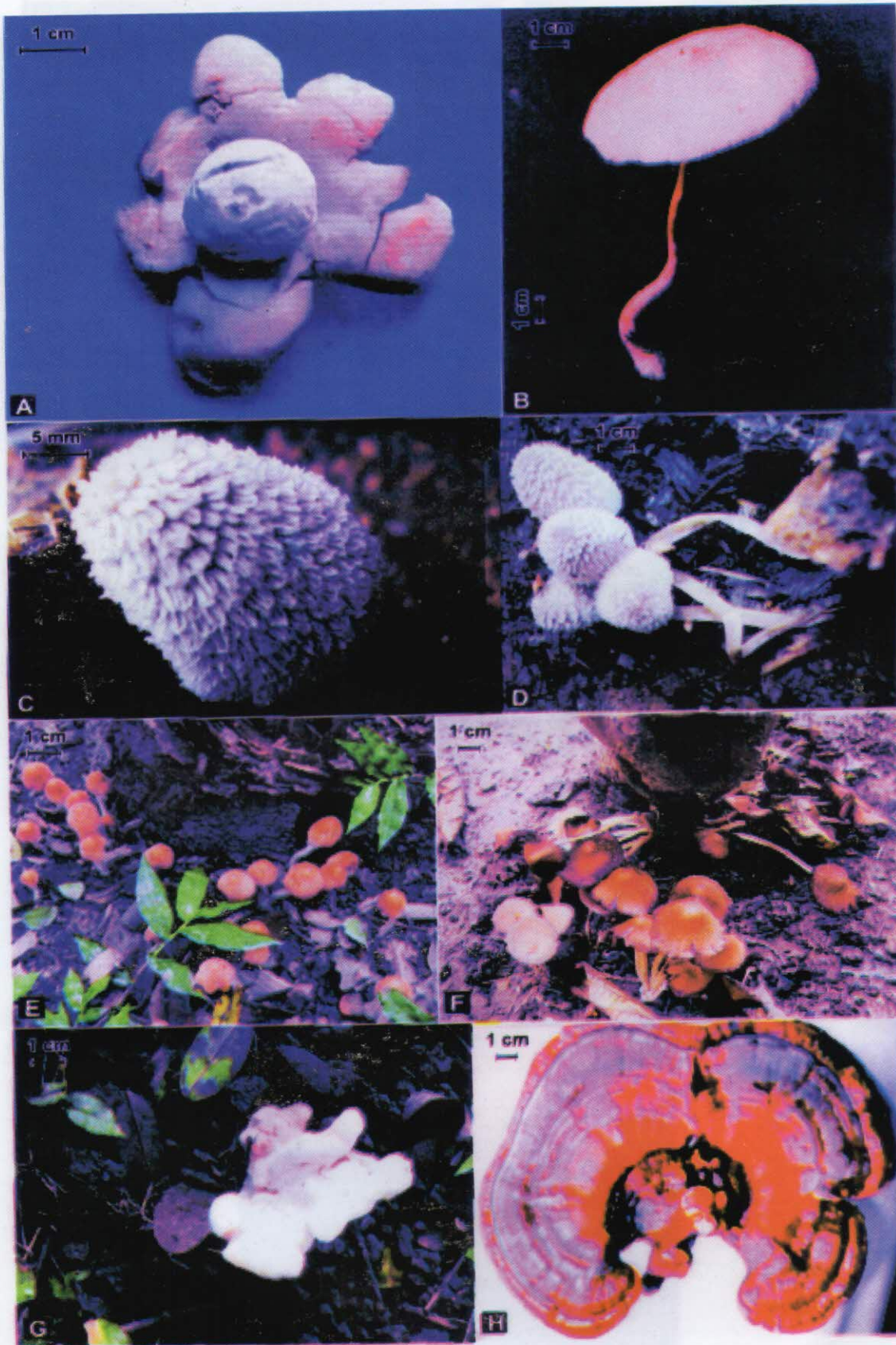


Fig. 2: A. *Geastrum triplex*, B. *Agaricus* sp., C. *Coprinus comatus* (young stage), D. *Coprinus comatus* (mature stage) (Photograph No. 14), E. *Coprinus micaceus* (young stage), F. *Coprinus micaceus* (mature stage) (Photograph No. 15), G. *Ganoderma lucidum* (young stage), H. *Ganoderma lucidum* (mature stage).

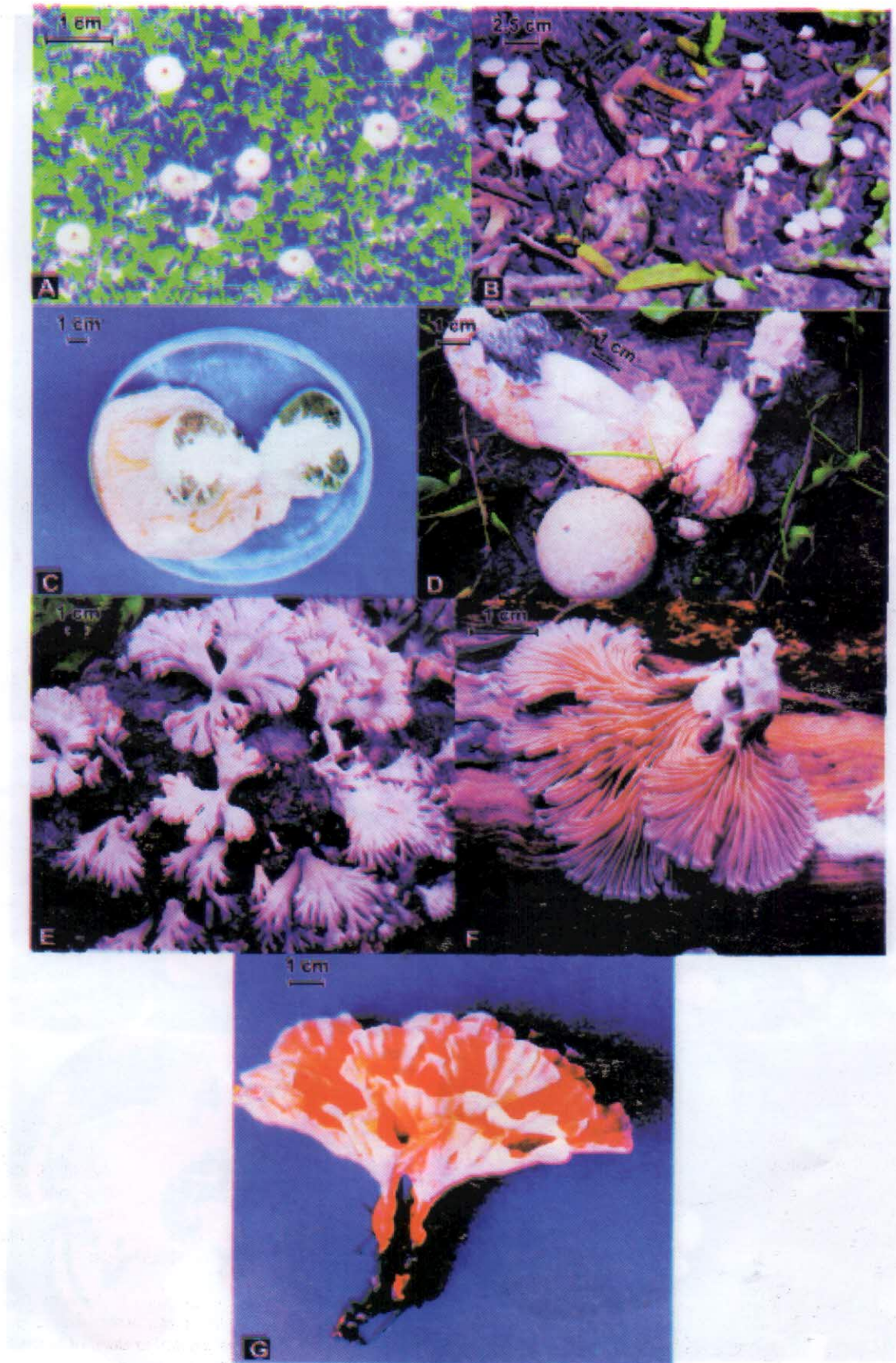


Fig. 3: A. *Inocybe* sp., B. *Mycena* sp., C. *Phallus impudicus* (young stage), D. *Phallus impudicus* (mature stage), E. *Schizophyllum commune* (fruiting body), F. *Schizophyllum commune* (gills), G. *Thelephora* sp.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Thelephoraceae	<i>Thelephora</i>	<i>T. anthocephala</i>	-	+	+	-	++				
		<i>T. regularias</i>	+	+	-	-	++				
Russulaceae	<i>Lactarius</i>	<i>L. subdulcis</i>	+	-	-	-	+	±	-		
Strophariaceae	<i>Pholiota</i>	<i>P. squarrosa</i>	+	+	-	-	++	-	-	Liginicolous, Heartwood rot	
Tricholomataceae	<i>Collybia</i>	<i>Cyathus. sp.</i>	+	-	-	-	+	-	-		
		<i>Lyophyllum</i>	<i>L. connatum</i>	+	+	-	-	++	+	-	
		<i>Marasmius</i>	<i>Marasmius. sp.</i>	-	+	+	-	++	-	-	
Gasteromycetes											
Nidulariales											
Nidulariaceae	<i>Cyathus</i>	<i>Cyathus. sp.</i>	+	-	-	-	+	-	-	Bird nest fungi	
Phallales											
Phallaceae	<i>Phallus</i>	<i>P. impudicus</i>	-	+	-	-	+	-	-	Stink horn	
Lycoperdales											
Gestraceae	<i>Geastrum</i>	<i>G. triplex</i>	-	+	+	-	++	-	-	Earth ster	
Lycoperdaceae	<i>Lycoperdon</i>	<i>L. pyriforme</i>	-	+	+	-	++	+	-	Puff bali	

Schizophyllum all the genera and species are new reports from Allahabad. Also, seven species such as *Amanita phalloides*, *Crepidotus variabilis*, *Lepiota procera*, *Lyophyllum connatum*, *Macrolepiota excoriata*, *Thelephora anthocephala* and *Thelephora regularis* are being reported here for the first time from India. Three genera such as *Crepidotus*, *Entoloma* and *Lactarius* are new genera from Uttar Pradesh. Five species namely *Auricularia polytricha*, *Geastrum triplex*, *Lactarius subdulcis*, *Lycoperdon pyriforme* and *Pholiota squarrosa* are also being reported here for the first time from Uttar Pradesh. The genus *Mycena* and species *Phallus impudicus* are new record from Allahabad. Earlier these were reported from Saharanpur and Varanasi also (Bilgrami et al., 1979; Bilgrami et al., 1991; Jamaluddin et al., 2004).

The occurrence of such diverse macrofungi in Allahabad is significant as majority of Basidiomycetous fungi recorded from Uttar Pradesh and other states have been from hilly areas. Allahabad with diverse climatic conditions is not only the home for diverse type of vegetation but diverse type of fungi as well.

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