Addition of macrofungi to fungi of India, from Kolhapur district

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Abstract
The present paper deals with the report of 24 species of macrofungi belonging to clavarioid, cantharelloid, agaricoid, hydnoid and poroid basidiomycetes. Of which, 9 species are found to be new records (additions) to the fungi of India, 10 species are reported new to the state of Maharashtra, while 9 species are reported on hitherto new hosts. All the species were collected from different localities of Kolhapur district.

Keywords: *Basidiomycetes, Macrofungi, New reports.*

Introduction

Kolhapur is the extreme southern district of Maharashtra state encompassing an area of about 7685 sq. kms (Banthia, 1995-96) and it is an irregular belt of Deccan plateau lying along east of Sahyadri crest. The district is blessed with hilly terrain which is the main natural feature that includes the main range of Sahyadri running north and south and large spurs stretch north-east and east from Sahyadri and valleys. The wet rugged hilly terrains provide luxuriant suitable forest. The climate of the district is tropical and receive south-west and north-east monsoon. The temperature remains between 21°C to 30°C during the months from June to September, with average relative humidity between 57 % to 70 %. Such conditions provide favorable conditions for nurturing the macrofungi.

Fungi are diverse group of organisms classified into micromycetes and macromycetes or macrofungi i.e. within their own kingdom. Among them, basidiomycetes are the largest group which comprises gill fungi and pore fungi. Most of them live as saprophyte and contribute in maintaining biological balance of nature and play important role in natural cycle as decomposer and returning nutrients to the soil. However certain species form mycorrhizal association with the plants, while several are parasitic. Fleshy macrofungi contribute large number in Basidiomycetes and they are gill fungi which grow mostly on humus rich soil and leaf litter while some are causing wood rots called wood rotting fungi or pore fungi.

Several workers (Patil and Thite, 1977, 1978a,b; Patil, 1978; Thite, *et al.*, 1976; Thite and Patil, 1982) studied fleshy fungi from some parts of Western Ghats.

Materials and Methods

Macrofungi of fleshy forms and wood rotting forms were collected from localities like Panhala, Pargaon, Kagal social forestry nursery, Radhanagari, Tarabai park (PWD garden), Kolhapur, Shivaji University campus Kolhapur, Korochi, Ichalakaranji, Pattan-kodoli, Chokak, Ujlaiwadi during August and September of year 2014. These were photographed in their natural habitats and brought to the laboratory. Morpho-taxonomical characters were noted, slides were made in lactophenol and stained with cotton blue. Fleshy specimens were preserved in 5 % formaldehyde solution with field numbers, while wood rotting fungi specimens were air dried and preserved in polythene bags with field

numbers and deposited in the departmental herbarium of DKASC, College, Ichalkaranji.

Specimens were identified by using standard literature (Thind, 1961; Ainsworth *et al*., 1973; Kibby, 1977; Surange and Sonar, 1980; Bhide *et al*., 1987; Pacioni, 1995; Laessoe and Conte, 1996; Konemann, 1998; Sarbhoy, 2000; Swanton, 2003; Kanad Das, 2009; Hakimi *et al*., 2013). However, fungi records were checked by referring standard literature (Butler and Bisby, 1931; Vasudeva, 1962, 1964; Tandon and Chandra, 1963-64; Kamat *et al.*, 1971; Mukherjii and Juneja, 1975; Bilgrami *et al*., 1981, 1991; Bhide *et al*., 1987 and Jamaluddin *et al.*, 2004) and online database (Farr and Rossman, 2015). Host plants were identified by using flora of Kolhapur district (Yadav and Sardesai, 2002).

Results and Discussion

A total of 24 species of macrofungi have been found to be new records, of which 17 species are fleshy fungi and 7 species belong to polyporoid forms. Among these 17 fleshy forms, 14 species are agaricoid, 2 of coral form and one of canthereloid. However, 9 species are recorded for the first time from India, while, 10 species are reported for the first time for the state of Maharashtra. While 7 species are reported on new hosts (Table 1).

The Clavarioid, Cantharelloid and Agaricoid species were found to be thriving well as saprophytes on humus rich soil, leaf litter and compost. However, one species of *Termitomyces* found to be growing on ant hills or termitorium, while *Phellinus igniarius* is strongly parasitic on the host *Schotia brachypetala* (Fabaceae) in Shivaji University campus, Kolhapur. Among the wood rotting fungi, species of *Trametes*, *Ganoderma*, *Phellinus* and *Onnia* from poroid fungi were found to cause wood rot of angiosperm hosts, however *Dentinum rufescens* and *Russula aeruginea* were found to form mycorrhizal association with roots of angiosperm hosts like *Dalbergia sisso* and *Leucaena latisiliqua* of Leguminoceae family.

Since Kolhapur district is the southern district of Maharashtra state blessed with varied physical feature and harbor a great diversity of plants with luxuriant vegetation, serious attention was paid to explore plant wealth of this district which resulted in publication of flora of the district. But yet, the taxonomy of Basidiomycetous macrofungi was less attempted by mycologists of this region. Therefore, it can be concluded that, the diversity of these fungi explored within rainy months in very short period indicates that, the thorough and exhaustive explorations are needed to understand the diversity of basidiomycetous macrofungi from the district.

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Sr. No.	Name of the species	Common Name	Substrata	Fruit body size	Gills	Spore deposit	Field No.	Date of Collection	Locality	Status
1	*Cantharellus infundibuliformis* (Scop.) Fr.		On rooting trunk of rain tree	Cap 9 cm in diam., stipe 10 cm (h), orange-yellow, fruit bodies in groups of 3-5 carpophores	Undulate decurrent	Golden yellow	DKASC–3	16.09.2013	DKASC College garden, Ichalkaranji	NMS, NH
2	*Clavaria cinereus* Bull.	Coral fungi	Humicolous soil	Height up to 8 cm, tips shortly branched greyish		White	PAN–2	17.08.2014	Panhala	NI
3	*Coprinus comatus* (O.F. Mull.) Pers.	Lawyer's wig	On decaying trunk of *Sterculia foetida*	Cap 3-5 cm in diam., stipe 9 cm (h), fairy pink to gray	Free crowded	Brownish black	DKASC–4	20.09.2013	DKASC College garden, Ichalkaranji	NH
4	*Dentinum rufescens* (Pers.) Pouzar		On roots of *Leucaena latisiliqua* (mycorrhizal)	Pileus 17.5 cm in diam., humped spongy flesh white	Tubular	Hyaline	KN–4	13.08.2014	Kagal nursery, Kagal	NMS
5	*Ganoderma applanatum* (Pers.) Pat.	Artists fungus	On stem of *Albizia sp.*	Bracket	Pores whitish	Brown	PAN–6	17.08201	Panhala table land	NMS, NH
6	*Ganoderma lucidum* (Curtis) P. Karst.	Varnished polypore	On root of *Eucalyptus globbulis*	Bracket up to 16 cm wide, stipe up to 4 cm long	Pores whitish	Brown	KN–5	13.08.2014	Kagal nursery, Kagal	NH
7	*Ganoderma lucidum* var.	Varnished polypore	On trunk of *Lucaena*	Bracket up to 8 cm wide, stipe 9 cm long,	Pores whitish	Brown	ICH–1	14.08.2014	Ketkale farms,	NH

	lucidum		*latisiliqua*	tanbrown					Ichalkaranji	
8	*Hygrophoropsis aurantiaca* (Wulfen) Maire	False chanterelle	On decaying wood of *Sterculia foetida*	Cap up to 10 cm, stipe 6 cm (h), orange yellow	Decurrent	Whitish	DKASC–1	20.08.2013	DKASC College, Ichalkaranji	NI
9	*Lepiota cristata* (Bolton) P. Kumm.	Stinking parasol	On cut surface of rotting wood of unidentified angiosperm	Stipe up to 17 cm	Closely arranged	White	HER–3	02.07.2013	Herle	NMS
10	*Leucocoprinus luteus* (Sacc.) Locq.	Yellow Parasol	On humus rich soil	Cap 5 cm in diam., stipe 7-11 cm (h), yellow, brusing reaction carrot red	Not crowded	White	DKASC–2	20.08.2013	DKASC College, Ichalkaranji	NMS
11	*Leucopaxillus giganteus* (Sowerby) Singer	Giant funnel cap	On humus rich soil	Cap 22 cm in diam., stipe 18 cm (h), dingy white-cream	Decurrent	Whitish cream (blue stained with iodine)	UJ–2	08.08.2014	Ujlaiwadi, Kolahpur	NI
12	*Marasmiellus remealis* (Bull.) Singer	Twig mummy-cap	Leaf litter	Cap up to 2 cm in diam., stipe 2.5 cm (h), fruit body in groups	Free	White	SUK–5	21.07.2013	Shivaji University campus, Kolhapur	NMS
13	*Marasmius alliaceus* (Jacq.) Fr.	Wood garlic mummy-cap	On decaying sticks	Cap up to 5 cm in diam., stipe 4 cm (h), fruit body in groups	Widely spaced	White	SUK–4	21.07.2013	Shivaji University campus, Kolhapur	NI

14	*Marasmius scorodonius* (Fr.) Fr.		On compost	Cap up to 1.5 cm in diam., stipe 3-5 cm (h), fruit body in groups	Free	White	SUK–2	21.07.2013	Shivaji University campus, Kolhapur	NI
15	*Onnia tomentosa* (Fr.) P. Karst.		On roots of *Peltophorum pterocarpum*	Pileus up to 16 cm in diam., stipe 4 cm (h) , chocolate brown, tanbrown		Yellowish brown	SUK–18(g)	14.09.2014	Shivaji University , Kolhapur	NI
16	*Paxillus* sp.		On roots of *Delonix regia*	Cap 4 cm in diam., up to 3.5 cm in height brownish orange, bruising stipe-brownish	Closely arranged	Brown	PAR–1	10.08.2014	Pargaon, Warnanagar	NMS
17	*Phellinus igniarius* (L.) Quel.	Grey fire bracket	On *Schotia brachypetala* living stem	Up to 15 × 4 cm, perennially persisting, upper- dark brown white layer, lower-chocolate brown shining	Pore	White	SUK–19	27.07.2014	Shivaji University campus, Kolhapur	NH
18	*Pleurotus ostreatus* (Jaacq.) P. Kumm.	Common oyster mushroom	On living coconut leaf sheaths	Cap 10 cm wide, margin enrolled, off white/ buff	Cream colour, spreading at margin	White	KN–2	13.08.2014	Kagal nursery, Kagal	NMS, NH
19	*Ramaria botrytis* (Pers.) Ricken	Pink tipped coral fungi	Humus rich soil	Height 7-12 cm, branching tips pink-purple		Ochre	PAN–3	17.08.2014	Panhala	NI

20	*Russula aeruginea* Lindblad	Verdigris russule	On humus rich soil	Up to 9 cm in diam., stipe up to 15 cm in height, Iodine reaction-hymenium wall dark brown	Not decurrent	White	UJ–1	11.08.2014	Ujlaiwadi, Kolhapur	NI
21	*Sparassis crispa* (Wulfen) Fr.	Couliflower fungus	Rotting trunk of *Spathodea campanulata*	Carpophore up to 40 cm, ochreous		White	TP–1	11.08.2014	PWD garden, Tarabai park, Kolhapur	NH
22	*Termitomyces eurhizus* (Berk.) R. Heim	Termite mushroom	On ant hills	Cap 18 cm in diam., stipe 16 cm, cap diseased, edible	Closely arranged	White	KN–1	13.08.2014	Kagal nursery, Kagal	NMS
23	*Trametes gibbosa* (Pers.) Fr.	Beech bracket	At the base of rotting trunk of *Peltophorum pterocarpum*	Pileus 25 × 12 × 3 cm, gray-pale yellow, lower surface cream coloured	Pore	White	ICH–19	19.09.2014	Ichalkaranji sugar factory road	NMS, NH
24	*Tricholoma lascivum* (Fr.) Gillet	Oak knight cap	On decomposed Soybean husk	Cap up to 9 cm in diam., stipe 5-7 cm in height, pale leather colour strongly aromatic	crowded	White	ICH–1	15.08.2014	Chokak	NI

Table 1. Morpho-taxonomical characters of macrofungi from Kolhapur district
(NI= New to India; NMS= New to the state of Maharashtra; NH= New host record)