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Eight new records of poroid fungi from Western Ghats of Pune District (Maharashtra)

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ABSTRACT

A total of 8 species of poroid fungi, namely *Trametes leonina*, *Hexagonia caperata*, *Inonotus cuticularis*, *Daedalea flavida*, *Polyporus alveolaris*, *Polyporus tricholoma*, *Rigidoporus ulmarius* and *Polyporus grammocephalus* are being reported for the first time from Maharashtra.

Key words- *Polyporaceae*, *Hymenochaetaceae*, fungi, Maharashtra, Pune, Western Ghats

INTRODUCTION

Pune, district situated in the Western region of Maharashtra between 17°52' to 19°23' North and 73°20' to 75°10' East, extends over an area of 15, 640 km². It lies on the leeward side of the Western Ghats or Sahyadri mountain range and extends on to the Deccan Plateau on the East at an altitude of 567.84 m above mean sea level (Anonymus 1976). The forest area falls under "reserved" forests category and can be categorised into Tropical stunted semi-evergreen forests, Tropical moist deciduous forests, Tropical stunted semi-evergreen forests and scrubby woodlands, Tropical moist deciduous forests and scrubby woodlands and Tropical dry deciduous forests and mixed forests. With the change in the forest type, the fungal flora also shows the variation in their forms. The detailed floristic account of the study area has been provided by Champion and Seth (1968), who included Western Ghats in the Sub - tropical category and Jagdale (1994) who considered it to be of tropical type. Janardhanan (1966) compiled the flora of Western Ghats. Vaidya (1987), Vaidya and Bhor (1990), Vaidya *et al.* (1991), Rabba *et al.* (1994), Vaidya and Rabba (1993a; b), Naik-Vaidya (1990), Nanda (1996), Ranadive (2012; 2013) and Ranadive *et al.* (2011; 2013) contributed towards the study of wood rotting mycobiota of the Western Ghats. Earlier, a total of 256 species of wood rotting fungi including 170 species of poroid fungi and 20 species of non - poroid fungi have been listed from the study area (Ranadive *et al.*, 2011) However, taking into consideration the vast area under different types of forests and very little number of poroid fungi reported from the study area the author took up the present study and conducted extensive field surveys in 12 different localities situated in the Western Ghats of Pune district. It is pertinent to mention that the same localities were visited twice or thrice for the collection of these fungi. (Ranadive, 2012).

TAXONOMIC DESCRIPTIONS

1. *Trametes leonina* (Klotzsch) Imazeki, *Bulletin of the Government Forest Experimental Station Meguro* **57**: 120 (1952)

Plate 1 Fig. 1; **Plate 2** Fig. A

Basidiocarps annual, pileate, broadly attached; pilei up to 5 × 10 × 3 cm (Pileus: width × length from substrate × thickness near the base), semicircular to elongated, mostly

with convex pileus, but sometimes deflexed with narrow pileus; soft when fresh, tough when dry; abhymenial surface flat to convex, covered with a dense mat of strigose hairs, becoming hispid with age, pure white when fresh, turning straw-coloured and finally greyish in mature specimens, the tomentum is distinct down 2-3 cm depth at the base, thinner towards the margin which is rounded and straight in fresh specimens, often deflexed when dry; hymenial surface flat or decurrent on oblique substrates, white when fresh, becoming straw-coloured on drying, pores large and angular, mostly 1-2 per mm in young specimens, large and often deeply split to an almost hydroid hymenophore in larger specimens being 1-2 mm across, tubes mostly concolorous with pore surface, but white towards the context, up to 10 mm deep at the base; context white, hard, fibrous and horizontal in the lower part, up to 5 mm in thickness, the upper part somewhat loose, with fibres bent upwards into the tomentum forming upper part of the context. Hyphal system trimitic; generative hyphae clamped, up to 4 µm in diameter, thin-walled, much branched; skeletal hyphae thick-walled to almost solid, deeper in the pileus, up to 8 µm in diameter; binding hyphae up to 6 µm in diameter; cystidia absent; basidiospores 6.25 – 11.25 × 3 – 6.5 µm, cylindrical, hyaline, smooth, inamyloid.

Materials examined: India, Maharashtra, Pune, Lohagad, Parasitic and saprophytic on *Terminalia* sp., VKPO-37, March 23, 2008; VKPO-39, March 23, 2008; VKPO-73, March 23, 2008; Harishchandragad, saprophytic on *Terminalia* sp. VKPO-38, December 1, 2008; Lonawala-Wandre Khind, on dead angiospermous wood, VKPO-40, November 16, 2008.

Distribution: Tropical Africa, Senegal Asia, Pakistan, India and Sri Lanka. New Guinea.

Remarks: This species can be easily recognized in the field on the basis of white basidiocarps becoming straw coloured on drying and a dense mat of strigose hairs on the pileus.

2. *Hexagonia caperata* (Pat.) Murrill, *Bulletin of the Torrey Botanical Club* **31** (6): 331 (1904)

Plate 1 Fig. 2, **Plate 2** Fig. B

Basidiocarps pileate; pilei sessile to effused-reflexed, up to 6 cm in radius, horizontal to slightly ascending, often

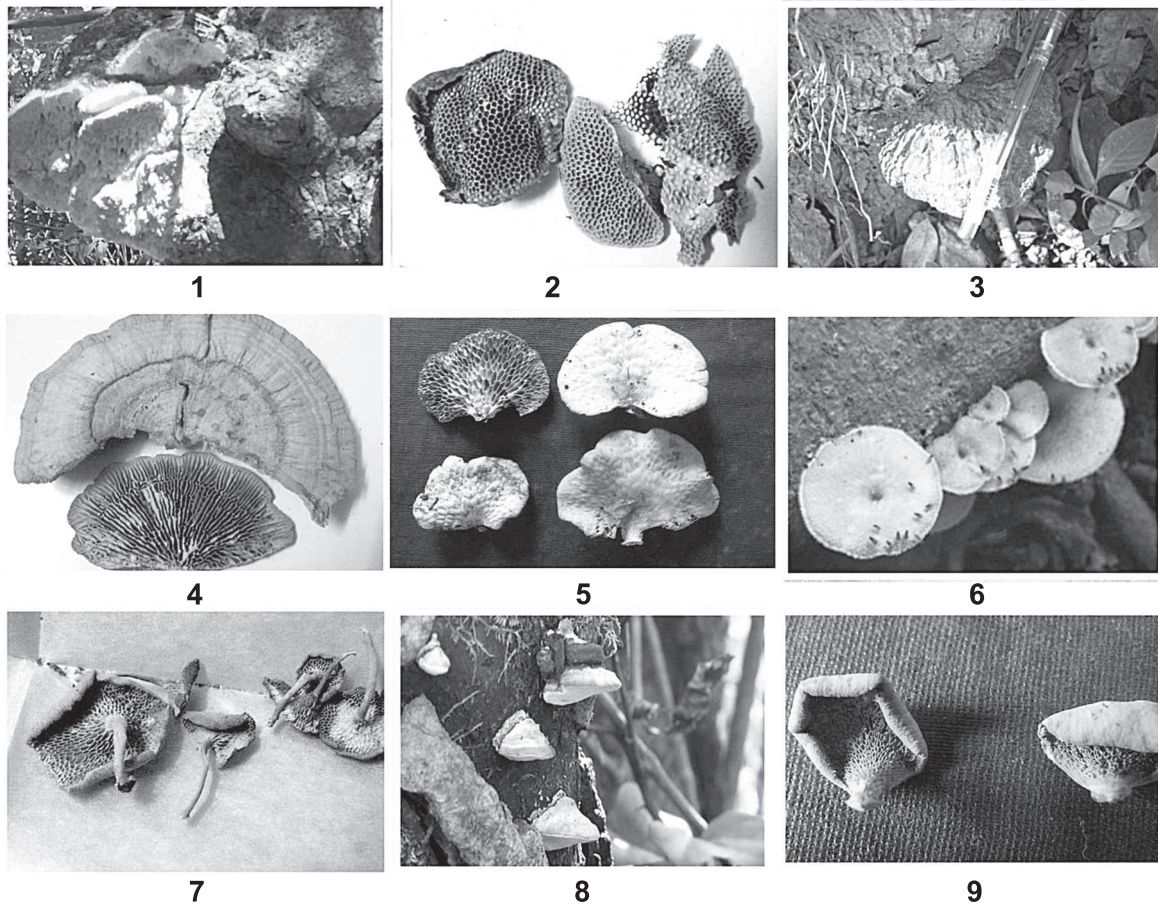


Plate 1 Basidiocarp of 1. *Trametes leonina* 2. *Hexagonia caperata* 3. *Inonotus cuticularis* 4. *Daedalea flavida* 5. *Polyporus alveolaris* 6. *Polyporus tricholoma* 7. *Polyporus tricholoma* 8. *Rigidoporus ulmarius* 9. *Polyporus grammocephalus*

fusing laterally' abhymenial surface first pale brownish with fuliginous fuscous zones, then fuscous brown with darker brown 2-6 mm wide, alternating with narrower dark fuscous fuliginous, smooth or apressedly fibrilloso-fasciculate zones, sometimes developing fibrilloso-spicate, subspathulate; margin white, entire; pileus drying radially rugulose; tubes 1-3 mm long, concolorous with the flesh becoming plugged with pale hyphae; pores 100-150 μ m wide, dissepiments 60-155 μ m thick, pale brownish wood-colour with a white or greyish bloom; flesh 1-1.8 mm thick at the base of the pileus. Hyphal system trimitic; hyphae scarcely swelling in KOH solution, without encrustation, non dextrinoid; generative hyphae up to 3 μ m wide, hyaline, clamped, branched; skeletal hyphae up to 5 μ m wide, lumen wide, aseptate or sparsely secondarily septate, unbranched, unlimited in the dissepiments, forming more or less straight skeletal ends in tomentum on pileus surface; binding hyphae up to 2.5 μ m wide, brownish, slightly thick walled; hyphal pegs up to 35 μ m long, sparse to abundant; cystidia absent; basidia not seen; basidiospores 5-7.5 x 2-2.8 μ m, oblong ellipsoid, smooth, guttulate, inamyloid.

Materials examined: India, Maharashtra, Pune, Bhimashanker, on fallen stumps of angiosperms, VKPO-41, 12/11/07; Dongarwadi, on dead branches of *Mangifera*

sp., VKPO-42, 7/5/07, VKPO-66, 26/10/08; Lonawala, on dead angiospermous twigs, VKPO-44, 23/12/08; Kalkaimata Devrai, on dead angiospermous twig, VKPO-45, 12/11/08, Harishchandragad, on unidentified angiospermous wood, VKPO-46, 1/12/08.

Distribution: Tropical Africa and America, Brazil, Amazonas, Manaus

Remarks: It can be easily recognized on the basis of numerous narrow finely velutinate to appressed tomentose zones on the pileus surface and small sized pores.

3. *Inonotus cuticularis* (Bull.) P. Karst., *Meddelanden af Societas pro Fauna et Flora Fennica* 5: 39 (1879)

Plate 1 Fig. 3, Plate 2 Fig. C

Basidiocarps pileate, annual, sessile, solitary, dimidiate, appanate; pilei up to 6 x 11 x 1.2 cm; abhymenial surface reddish brown, becoming glabrous and finally blackened faintly zonate, smooth or shallowly sulcate; margins concolorous, usually acute, sterile below; hymenial surface pale brown, glancing, pores angular, 3-5 per mm, dissepiments thin; context bright yellowish; tube layer pale brownish, tubes often yellowish brown within, up to 8 mm thick. Hyphal system monomitic; generative hyphae up to 6.25 μ m in diameter, branched, hyaline to pale

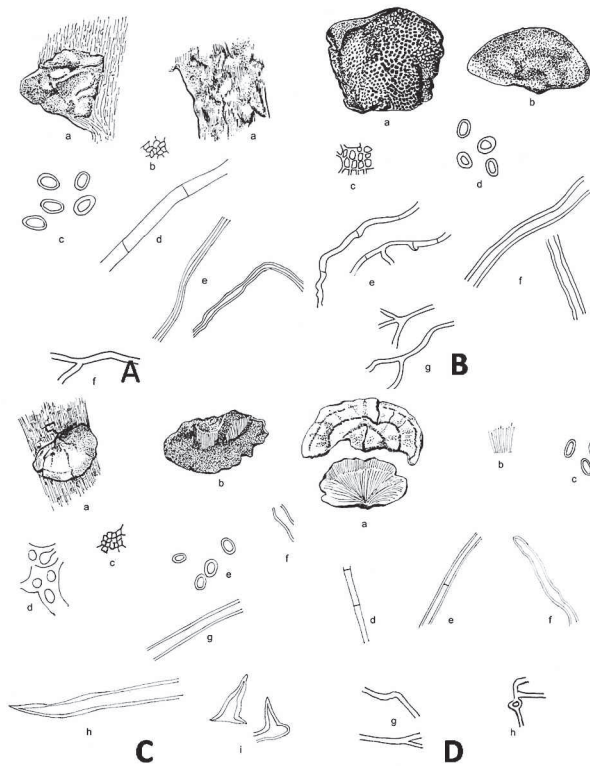


Plate 2 Fig. A *Trametes leonina* a. Habit, b. Pore shape, c. Basidiospores, d. Generative hypha, e. Skeletal hyphae, f. Binding hypha. **Fig. B** *Hexagonia caperata* a. and b. Habit, c. Pore shape, d. Basidiospores, e. Generative hyphae, f. Skeletal hyphae, g. Binding hyphae. **Fig. C** *Inonotus cuticularis* a. and b. Habit, c and d. Pore shape, e. Basidiospores, f. Generative hypha g. and h. Setal hyphae, i. Hymenial Setae. **Fig. D** *Daedalea flavida* a. Habit, b. Pore shape (Lamellae), c. Basidiospores, d. Generative hypha, e. and f. Skeletal hyphae, g. and h. Binding hyphae.

yellowish to pale brownish, thin to thick-walled; setal hyphae branched, abundant on pileus surface, up to 10 μm in diameter, thick-walled unbranched setal elements similar to hymenial setae also present on hymenial surface; hymenial setae 12-20 \times 4-7.5 μm , abundant, subulate to ventricose, frequently hooked, thick-walled; basidia not seen; basidiospores 6-8.75 \times 3.5-5 μm , broadly ellipsoid to ovoid, pale to dark yellowish brown, inamyloid.

Distribution: U.S., Canada, Japan, China, Russia and South to Central Europe and India

Materials examined: India, Maharashtra, Pune, Ahupe, parasite on unknown angiosperm, VKPO-275, October 29, 2009; VKPO-276, October 29, 2009.

Remarks: The species is recognized on the basis of branched setal hyphae on the pileus.

4. *Daedalea flavida* Lév., *Annales des Sciences Naturelles Botanique* 2: 198 (1844)

Plate 1 Fig. 4, Plate 2 Fig. D

Basidiocarps annual to perennial, pileate broadly attached; pilei up to 12 \times 12 \times 3 cm, semicircular to flabelliform,

coriaceous when fresh, flexible when dry; abhymenial surface first dull and very finely velutinate and soft to touch, with age becoming glabrous, but without a cuticle, concentrically zonate, weakly sulcate, smooth, first white, cream, pale ochraceous to clay-coloured, turning leather-coloured or dirty brownish, old and dead specimens are frequently whitish to dirty grayish; margins sharp, entire; hymenial surface dirty yellow, daedalioid to sinuous; hymenophore lamellate, lamellae up to 6 mm wide, straight, 8 to 10 mm deep; context yellowish, up to 7 mm thick. Hyphal system trimitic; generative hyphae hyaline, clamped, up to 1.5 μm wide; skeletal hyphae straight, thick-walled, pale yellowish, up to 9.7 μm wide; binding hyphae common, richly-branched, solid, up to 3.3 μm wide; cystidia absent; basidia not seen; basidiospores 6-7 \times 3-3.3 μm , cylindrical, smooth, thin-walled, inamyloid.

Materials examined: India, Maharashtra, Pune, Bhimashankar, on fallen stumps, VKPO-18, 12/11/07; VKPO-70, 12/11/07; Dongarwadi, on unknown angiospermous wood and fallen stumps, VKPO-19, 4/11/07; VKPO-71, 4/11/07, VKPO-72, 26/10/08; Harishchandragad, on *Memecylon umbellatum* wood, VKPO-20, 1/12/08; on fallen angiospermous stumps, VKPO-21, 1/12/08; VKPO-23, 1/12/08; Kakaimata Devrai, on fallen stumps, VKPO-24, 12/11/08; Lonawala-Kusoor, on fallen trunk of angiosperms and dead stumps, VKPO-25, 6/12/08; VKPO-259, 6/12/08; Lonawala-Dhak Bhairi, on angiospermous wood, VKPO-26, 2/11/08; fallen stumps VKPO-27, 2/11/08; VKPO-28, 2/11/08; and unknown woody climber, VKPO-29, 2/11/08; Lonawala-Wandre Khind, on angiospermous wood, VKPO-30, 16/11/08; Sinhagad, on angiospermous wood, VKPO-31, 5/11/08; VKPO-32, 5/8/07; Ahupe, on dead wood of *Bambusa* sp., VKPO-260, 23/12/08; on fallen angiospermous stump, VKPO-283, 29/10/09.

Distribution: Australian, Pakistan, Phillipine Islands, China, Australia and India.

Remarks: The species is typical in having having yellowish basidiocarps. The colour usually fades on the abhymenial surface but is persistent on the hymenial surface and in the context.

5. *Polyporus alveolaris* (DC.) Bondartsev & Singer, *Annales Mycologici* 39 (1): 58 (1941)

Plate 1 Fig. 5, Plate 3 Fig. E

Basidiocarps annual, stipitate to sessile, circular to dimidiate, up to 5 cm wide and 2-3 mm thick; abhymenial surface pale yellow, squamose with flattened, triangular squamules, becoming ivory to pale buff with age, azonate, glabrous, smooth; margin concolorous; hymenial surface white to tan, pores diamond-shaped, radially elongated, 1-2 per mm tangentially, tube layer continuous with the context, 2-5 mm thick; context pale yellow, azonate, corky, up to 1 mm thick; stipe lateral, buff, glabrous, up to 0.8 cm long and 4 mm thick. Hyphal system dimitic; contextual generative hyphae hyaline in KOH, thin-walled, rarely branched, clamped, up to 3 μm wide, forming cutis on the

stipe and the pilear surfaces; contextual skeleto-binding hyphae thick-walled, aseptate, much branched, with tapering apices, up to 5 μm wide; tramal hyphae similar; basidia 24-29 x 7-9 μm , clavate, 4-sterigmate, with a basal clamp; basidiospores 10-13 (14.5) x 3.5-5 μm , cylindrical.

Materials examined: India, Maharashtra, Lonawala, on dead wood, VKPO-145, 23/12/08.

Distribution: Europe, Asia and North America.

Remarks: The species is of common occurrence on dead branches of the tree.

6. *Polyporus tricholoma* Mont., *Annales des Sciences Naturelles Botanique* 8: 365 (1837)

Plate 1, Fig.6 & 7; Plate 3 Fig. F

Basidiocarps annual, solitary, centrally stipitate, 1-2 cm in diameter, flat to centrally depressed, up to 2 mm thick; margins flat when fresh, deflexed-curved on drying; Pileus pale brown, smooth, glabrous, up to 6 mm long; Stipe up to 2 cm long, 3 mm wide, more or less glabrous, pale tan to dirty brownish or pale reddish-brown, often somewhat

longitudinally wrinkled in dry condition; hymenial surface ochraceous to pale brown in old specimens, pores round to angular, 4-5 per mm, tubes as pore surface, up to 1 mm deep; context whitish to faint brown, up to 0.4 mm thick. Hyphal system dimitic; generative hyphae clamped, hyaline, up to 5 μm wide, freely branched, thick-walled to almost solid in old specimens; binding hyphae up to 3.8 μm wide. basidia not seen. basidiospores 5-8.75 x 2-4 μm , broadly ellipsoid, thin-walled, hyaline, inamyloid.

Materials examined: India, Maharashtra, Lonawala-Dhak, on dead angiospermous wood, VKPO-57, 2/11/08; on fallen stumps, VKPO-58, 16/11/08; Lonawala-Kusoor, on angiospermous stumps, VKPO-59, 6/12/08; Ahupe, on dead wood, VKPO-288, 29/10/09.

Distribution: Nigeria and India.

Remarks: The species is easily recognized when growing in groups of slender, white basidiocarps.

7. *Rigidoporus ulmarius* (Sowerby) Imazeki, *Bulletin of the Government Forest Experimental Station Meguro* 57: 97 (1952)

Plate 1 Fig. 8; Plate 3 Fig. G

Basidiocarps annual, solitary, attached to the substratum by a broad base, 2.5 x 1.6 cms in diameter, biconvex, up to 8 mm thick; margins blunt, more or less unguulate, curved. Pileus yellowish to orangish brown, wrinkled, up to 2 cm long when dry; hymenial surface faint yellow to pale brown in old specimens, pores round to oval, 3-4 per mm, tubes concolorous to pore surface, up to 10 mm deep. Context concolorous with the tube layer, up to 4 mm thick. Hyphal system monomitic; generative hyphae clamped, up to 6.5 μm wide, hyaline freely branched, thick-walled to almost solid; cystidia absent; basidia 16-18.75 x 8 μm , 4 spored; basidiospores 6.4-16.1 x 6.4-9.7 μm , subglobose to oblong-ellipsoid, tapering at one end, smooth, thin walled hyaline, inamyloid.

Materials examined: India, Maharashtra, Purandar, on dead tree of *Terminalia* sp. VKPO-36, (30/10/08).

Distribution: Pune, India.

Remarks: Species found to be occurring always on the tree bark on the slopes. Pores are very soft to touch. The specimens generally get the borer infection early.

8. *Polyporus grammacephalus* Berk., *London Journal of Botany* 1 (3): 148 (1842)

Plate 1 Fig. 9; Plate 3 Fig. H

Basidiocarps annual, solitary or several growing from a common point on the substratum, coriaceous and corky, very shortly stipitate; pileus spatulate, flabelliform or dimidiate, tapering towards the base; abhymenial surface flat or slightly convex, may be depressed near the stipe, straw coloured with sharp fine radial striations; margin thin, entire or lobed, sterile below; hymenial surface white to ochraceous, pores hexagonal, radially aligned, 1-4 per mm, dissepiments very thin, tubes up to 3 mm long;

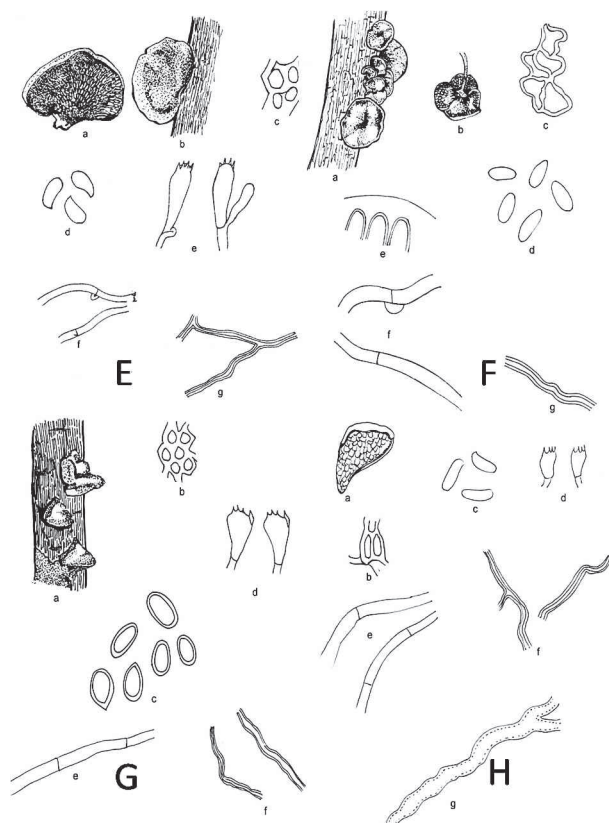


Plate 3 Fig. E *Polyporus alveolaris* a. and b. Habit c. Pore shape, d. Basidia, e. Basidiospores, e. Basidia, f. Generative hyphae, g. Skeleto-binding hypha. **Fig. F** *Polyporus tricholoma* a. and b. Habit c. Pore shape, d. Basidiospores, e. V. S. of Pileus, f. Generative hyphae, g. Binding hypha. **Fig. G** *Rigidoporus ulmarius* a. Habit, b. Pore shape, c. Basidiospores, d. Basidia, e. Generative hypha. **Fig. H** *Polyporus grammacephalus* a. Habit, b. Pore shape, c. Basidiospores, d. Basidia, e. Generative hyphae, f. Binding hyphae, g. Gloeoclerous hypha.

context white, up to 1 mm thick; stipe very short, lateral, about 5 mm in diameter and up to 8 mm long. Hyphal system dimitic; generative hyphae hyaline, thin-walled, rarely slightly thick-walled, simple septate, branching not common, up to 3.5 μm wide, abundant in trama and rare in context; binding hyphae hyaline, corrugated, thick-walled, in the context showing wide lumina, in trama frequently subsolid to solid, usually dichotomously branched, 3.0-6 μm wide, often tapering to 1.5-2.0 μm ; gloeoplerous hyphae up to 8 μm wide; basidia 18.4-22.0 x 3.0-5.5 μm , clavate, hyaline, 4-sterigmate; basidiospores 5.0-7.5 x 2.0-3.0 μm , cylindrical, hyaline, thin-walled, smooth, inamyloid, some with one or two guttulae.

Materials examined: India, Maharashtra, Dongarwadi, on angiospermous stump, VKPO-74, 26/10/08; Sinhagad, on dead angiospermous wood, VKPO-60, 5/11/08; Lonawala-Dhak Bhairi, on fallen stumps, VKPO-61, 2/11/08; Lonawala, on dead wood, VKPO-145, 23/12/08; Bhimashankar, on dead wood, VKPO-217, 12/11/07.

Distribution: West Bengal, India and Africa.

Remarks: It can be differentiated from *F. brasiliensis* on the basis of smaller pores, and alutaceous to pale reddish-brown pileus with the radial striae. It can also be compared with *Polyporus philippinensis*, which has somewhat similar pileus colour and fine radial lines but can be distinguished by smaller pores.

DISCUSSION

The present taxonomic work has tremendous mycological significance and it will update the knowledge of poroid fungi of district Pune. To conclude, Pune district of Maharashtra state has its own uniqueness of ecosystem of wood rotting poroid fungi, causing decay of live standing trees and also from an adverse human interference. During the investigation so many localities were found to be very much disturbed because of too many human activities. So there is an urgent need for its conservation by proper protection from the Government of Maharashtra to restrict eliciting and cutting practice followed for fuel by the local inhabitants. Then only it will be possible to see perpetuation of some of the species of poroid fungi in near future.

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