



## Rotting of *Peltophorum ferrugineum* (Decne.) Benth. by pathogenic lignicolous fungi in Rajpipla, Gujarat, India

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### ABSTRACT

Lignicolous fungi play a significant role in destruction of forest flora especially wood, litter and living trees. Rotting of *Peltophorum ferrugineum* (Decne.) Benth. living trees by pathogenic lignicolous fungi like *Flavodon flavus* (Klotz.) Ryv., *Gloeophyllum sepiarium* (Fr.) Karst., *Ganoderma applanatum* (Pers.) Pat., *Phellinus badius* (Berk.: Cke) Cunn., *Phellinus robustus* (Karst.) Bourd. & Galz., *Phellinus pectinatus* (Kl.) Quel., *Phellinus hoehnelii* (Bres.) Ryv., *Phellinus conchatus* (Pers. : Fr.) Quel., *Phellinus pachyphloeus* (Pat.) Pat., *Phellinus rhabarbarinus* (Berk.) Cunn., *Phellinus setulosus* (Llyod) Imaz., *Phellinus caryophyllii* (Racib.) Cunn. and *Schizophyllum commune* Fr. was describe. For the first time all lignicolous fungi were recorded from Rajpipla, Gujarat, India. It was interesting to note that in Vadia palace, Rajpipla there are approximately 100 *P. ferrugineum* trees, out off which 69 plants were infected with pathogenic lignicolous fungi. In Arboretum of Botany Department, M.S. University of Baroda was surveyed, 10 plants were present, and out of that 7 plants were infected. Except *P. setulosus* which was already reported on *Peltophorum ferrugineum* all other *Phellinus* spp are new host records.

**Key Words:** Lignicolous fungi, *Phellinus*, Hymenochaetaceae, *Peltophorum ferrugineum* Rajpipla, Gujarat.

### INTRODUCTION

Lignicolous heart rotting fungi belonging to Aphyllophorales (Basidiomycetes) were economically important as many of these are pathogens of forest trees and cause serious damage. These lignicolous fungi were also important in the forest ecosystem as they were active decomposers of organic matter (Natarajan & Kolandavelu 1998). The wood decay by *Polyporus luteo-umbrinus* Romell on root and dead fallen branches of *Heritiera minor* was reported from Baroda (Bakshi 1971). Arya (2004) reported wood decay fungi like *Ganoderma lucidum* (Fr.) Ryv., *Trametes cingulata* Fr., and *T. varians* van der Bij. from Baroda and Shoolpaneshwar wildlife sanctuary. Arya *et al.* (2008) reported that *Lenzites sterioides* was recorded for the first time on *T. grandis*. Two other polypores *Navisporus floccosa* and *Corioulus aspera* were reported for the first time from India. Nagadesi & Arya (2012) reported *Aurificaria indica* var. *leucocephala* var. nov, and *Microporus affinis* var. *glabriceps* var. nov. were described and four species, *Fomitopsis cupreosea*, *Ganoderma curtisii*, *Microporus alboater* and *Phellinus shaferi* from Ratanmahal Wildlife Sanctuary (RWLS), Gujarat were new reports for India. *Phellinus* was

the largest genus of all polypores and undoubtedly also one of the most difficult ones. The reason was partly that many specimens were sterile while collected and this may make a definite determination difficult. It causes white rots in various kinds of live standing or dead angiospermic/ gymnospermic woods. The genus was cosmopolitan in nature occurring from tropical to sub-alpine forests. Quelet established the genus *Phellinus* with type species of *P. torulosus* Pers. Fr. in 1886.

Taxonomic studies of the genus *Phellinus* had been extensively done throughout the world (Lloyd 1915; Bondarzew 1953; Overholts 1929, 1941, 1953; Lowe 1957; Cunningham 1965; Fidalgo 1968; Niemela 1982; Ryvarde 1972; Donk 1974; Fiasson 1983; Gilbertson & Ryvarde 1987; Rajchenberg 1987, 1989). *P. rubriporus* (*Phellinus torulosus*) was selected by Donk (1960) as generic nomenclature type. Then the concept of *Phellinus* has remained stable. In India *Phellinus* was studied by Bagchee (1950 & 1961), Singh (1966), Bakshi (1955 & 1976), Thind & Dhanda (1980a), Roy (1979), Ganesh and Leelavathy (1986), Natarajan & Kolandavelu (1985) and Sharma (1995 & 2000).

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Morphological characters of reproductive stage such as attachment of basidiocarp, types of basidiocarps, consistency, pileus surface (glabrous or hairy, dull or glossy), margin, stipitate or sessile, pore surface, number of pore per mm. Xanthochronic reaction, hyphal system, setae, basidia and basidiospore, hyphal system are used in taxonomy of *Phellinus*. Hyphal system was always dimitic in all *Phellinus* species (Ryvarden & Johansen 1980; Overholt 1929; Keller 1985). Three hundred and sixty seven *Phellinus* has been reported in the CBS ([http://www.punenviis.nic.in/bd\\_list.htm](http://www.punenviis.nic.in/bd_list.htm)). Fifty-three species have been already reported from India (Sharma 2000). Eighteen species have been reported from Kerala (Ganesh & Leelavathy 1986). A few species of *Phellinus* was reported from Gujarat i.e. *Phellinus nilgheriensis* (Mont.) Cunn (Arya 2004). The aim of present investigation was to study rotting of living trees in Vadia palace Rajpipla caused by genus *Phellinus* and other polypores.

## MATERIAL AND METHODS

### Study Area

The princely state of Rajpipla was situated largely between two important rivers of western India i.e. the Narmada and the Tapti, with the Satpura range in the south. Spanning an area of over 1500 sq miles (4,000 km<sup>2</sup>), of which 600 sq miles (1550 km<sup>2</sup>) were forests and the rest fertile agricultural plains and river valleys, Rajpipla grew to be one of the most prosperous princely states in Gujarat, second only to Baroda. It was also famous for its agate mines. It was situated at 73°31'12"E Long and 21°51'31" N Lat. It was often referred to as the 'Taj of Gujarat'. The palace was set in a 151-acre estate, with well laid out formal gardens, mango and lime orchards. The building, including the outhouses, covered almost an acre - 4320 square yards. The palace was presently the Gujarat Forest Rangers College. In and around the palace 100 *Peltophorum ferrugineum* trees were planted as fencing. A survey was undertaken in Vadia palace between August 2007 to July 2011 and sporophores of different fungi were collected.

### Material Collection

Materials were collected in clean polythene bags from different locations and brought to the laboratory. The specimens were examined for external and internal morphology. For external morphology the materials was observed for colour, texture, type of attachment to host, pore morphology, dissepiments characters; margin, hymenial and pileal surface of basidiocarps and for

internal morphology (presence/absence of structures, dimensions, vegetative and reproductive characters (Ryvarden 1991). To observe basidia and setae, free hand sections were taken. For the clear observation of setae, trammel setae and setal hyphae, lacto phenol cotton blue was used as staining and mounting medium. For amyloid and non-amyloid reaction, spores were treated with iodine solution which turns blue. Xanthochoric reaction was also tested using potassium hydroxide solution. Microphotographs were taken by using Lyca trinocular microscope with canon digital camera attachment. The measurements of hyphae, basidia, cystidia, setae, spores and cutis elements etc were taken by using objective micrometer. Dimensions of microscopic characters are given in micrometer. The various details of specimens were compared with Hymenochaetaeaceae of India (Sharma 1995) Indian Polyporaceae (Bakshi 1971), CBS Aphyllophorales database, New Zealand Fungi database, and Species Fungorum, (Sep. 2005). Certain specimens were sent to the Forest Research Institute, Dehradun for final confirmation. These fungi were kept in fungal collection of Botany Department of The M. S. University of Baroda, India.

## RESULTS AND DISCUSSION

It was interesting to note that in Vadia palace, Rajpipla, there are approximately 100 *P. ferrugineum* trees, out of which 69 plants were infected with lignicolous pathogenic fungi and when Arboretum of Botany Department, M.S. University of Baroda was surveyed 10 plants were present, out of that 7 plants were infected. Rotting of *Peltophorum ferrugineum* (Decne.) Benth. living trees by pathogenic lignicolous fungi like *Flavodon flavus* (Klotz.) Ryv., *Gloeophyllum sepiarium* (Fr.) Karst., *Ganoderma applanatum* (Pers.) Pat., *Phellinus badius* (Berk.: Cke) Cunn., *Phellinus robustus* (Karst.) Bourd. & Galz., *Phellinus pectinatus* (Kl.) Quel., *Phellinus hoehnelii* (Bres.) Ryv., *Phellinus conchatus* (Pers. : Fr.) Quel., *Phellinus pachyphloeus* (Pat.) Pat., *Phellinus rhabarbarinus* (Berk.) Cunn., *Phellinus setulosus* (Llyod) Imaz., *Phellinus caryophyllii* (Racib.) Cunn. and *Schizophyllum commune* Fr. was observed. The fungi were identified and their taxonomic details were described below. Except *P. setulosus* which was already reported on *Peltophorum ferrugineum* other *Phellinus* spp were new host records. All the species of *Phellinus* were occurred in different places of Gujarat. For the first time all lignicolous fungi were recorded from Rajpipla, Gujarat, India.

## TAXONOMIC STUDIES

***Ganoderma lucidum* (Curtis) P. Karsten. Rev. Mycol. (Toulouse) 3(9): 17, 1881.**

***Polyporus lucidus* Fr. Syst. Mycol. 1: 353, 1821.**

The sporophores are perennial, stipitate, corky becoming woody later, 14-16 x 10-12 x 1-3 cm. many grow up to 30 cm. stalk lateral, varnished and encrusted, up to 10 cm long and 0.5 – 2 cm thick; upper surface shiny with laccate crust, reddish brown, smooth; context brown, 2-10 mm thick, hymenial surface brown, pores small, brown, 90-150  $\mu$  diameter, pore tubes 6-7 mm long; hyphal system trimitic; generative hyphae thin walled, hyaline, branched with clamp connection 1.5 - 3.12  $\mu$ m broad; skeletal hyphae light brown, thick-walled, lumen narrow, sparsely branched, 3.12 – 6.25  $\mu$ m; binding hyphae pale brown, thick walled much branched 3.12  $\mu$ m broad. basidiospores brown, thick walled, minutely verrucose, truncate at base, 8-10 x 5-6  $\mu$ m.

**Habitat:** It causing heart rot in *Peltophorum ferrugineum*, collected by N. Praveen Kumar, Accession no: MSU Bot.110, 22-4-2007

It causes serious root rot on many broad leaf species entering the host through wounds. *G. lucidum* (Ling chi in Chinese and Linjue in Thai) was popularly called as reishi mushroom. The latin word *lucidum* means shiny or brilliant and refers to the varnished surface of reishi cap, which was reddish orange to black

***Gloeophyllum sepiarium* (Wulfen) P. Karsten, Bidr. Känn. Finl. Nat. Folk 37: 79, 1882.**

Sporophore sessile, reflexed, developing close to substrate, solitary, corky, 5.6 x 5.4 x 2 cm; upper surface sepia coloured, margin pale, glabrous, weakly zoned (Fig.1D); hymenial surface snuff brown pores usually lamella, lamellae irregular with edges minutely serrated, 12-14 per cm, 3-5 mm broad (Fig.1E); context snuff brown, corky 2-5 mm thick; cystidia hyaline, slightly thick walled embedded in hymenium; hyphal system dimitic, generative hyphae hyaline, thin-walled, branched, clamps common 3.12  $\mu$ m broad; skeletal hyphae yellowish brown, thick walled, septate, unbranched 6.25  $\mu$ m broad. basidia cylindrical, 12-16 x 6.25  $\mu$ m (Fig. 4E); basidiospores hyaline, oblong ellipsoid, 9.3 x 5.12  $\mu$ m;

**Habitat:** Found on the living tree of *Peltophorum ferrugineum* causing stem rot, collected by N. Praveen Kumar, Accession no: MSU Bot. 125, 22-4-2007

It usually causes brown cuboidal rot. It was common in subtropical and tropical regions of north India on coniferous timber particularly *chir*,

*sal* and *Khair* (Bakshi 1971). In present paper it causes white rot on *Peltophorum ferrugineum*.

***Phellinus pectinatus* (Klotzsch) Quéle. Enchiridion Fungorum: 173, 1886.**

***Polyporus pectinatus* Klotzsch, Linnaea 8: 485, 1833.**

Basidiocarps perennial, pileate, applanate, frequently imbricate with several pilei from a common base, up to 22 cm wide, 15 cm broad and 3.5 cm thick near the base, woody hard and heavy when dry; upper surface compressible tomentum when young, yellowish brown, with age a black surface is exposed from base, finely sulcate with a thin black crust; margin entire, usually paler than the basal part of the pileus (Fig.1B); pore surface golden brown, glancing on turning to incident light, tubes distinctly stratified, 2 to 0.5 mm thick, thin context present between tube layer, pores tiny, invisible to the naked eye, 6-8 pores per mm (Fig. 1C), context duplex in younger specimens, the lower part very dense and dark reddish brown, 0.1 cm thick, the upper part more loose consistency than the lower part, distinct black line separating the upper tomentum and lower denser part. Hyphal system dimitic, generative hyphae thin-walled, hyaline, simple septate, 2.65  $\mu$ m, skeletal hyphae thick-walled, rusty brown, 5  $\mu$ m wide, hymenial setae absent, basidia 8 x 6.35  $\mu$ m, usterigmate, spores abundantly present, globose, hyaline, often collapsed 3.12 x 2.5  $\mu$ m in size (Fig. 4D).

**Habitat:** found on living tree of *Peltophorum ferrugineum*. Form Vadia palace Rajpipla Gujarat, collected by N. Praveen Kumar, Accession no: MSU Bot.101, 22-4-2007

It causing a white stringy rot on living trees of angiosperms belonging to genera murraya, Jaman, carissa, pyrus, prunus and Eugenia (Bakshi, 1971 and Sharma 1995) but in present paper it causes white rot on *Peltophorum ferrugineum*.

***Phellinus hoehnelii* (Bresadola) Ryvardeen, A preliminary polypore flora of East Africa: 173, 1980.**

***Fomes hoehnelii* Bresadola, Ann. Mycol. 10(5): 499, 1912.**

Basidiocarps perennial, pileate, subapplanate, sessile, broadly attached, woody hard on drying, 25 cm long, 12cm wide, 2 cm thick, pilear surface glabrous, encrusted, rusty brown; margin obtuse, thick, entire finely velutinate (Fig. 2A); pore surface golden brown; pores 3-5 per mm; tubes up to 1 cm deep, dark brown (Fig. 2B); context bright yellowish, delimited on upper surface by a

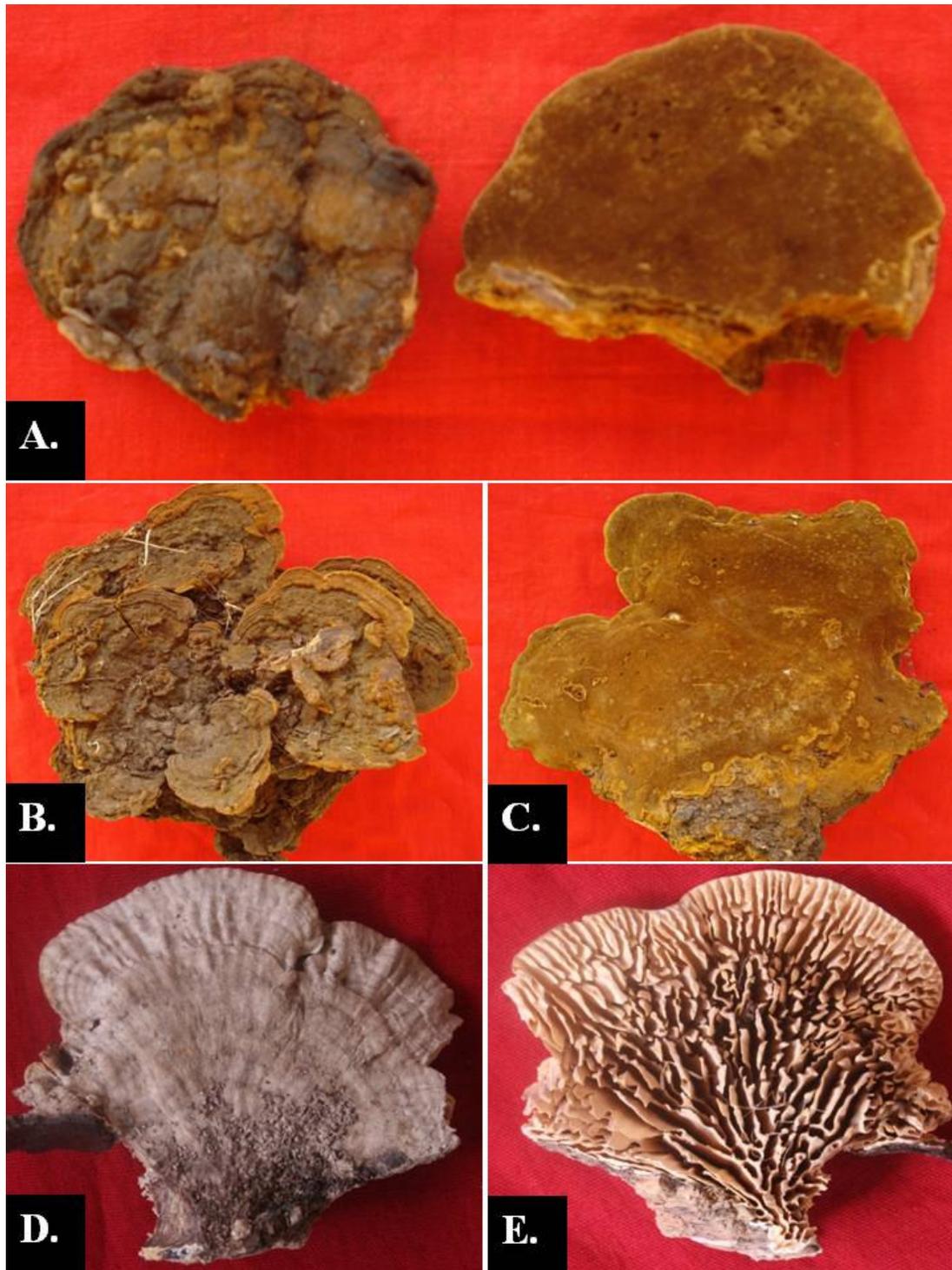


Figure 1. A) Upper and lower surface of *P. badius*, B) Upper surface of *P. pectinatus*, C) hymeneal surface of *P. pectinatus*, D) Upper surface of *G. sepiarum*, E) Hymeneal surface with lamellae

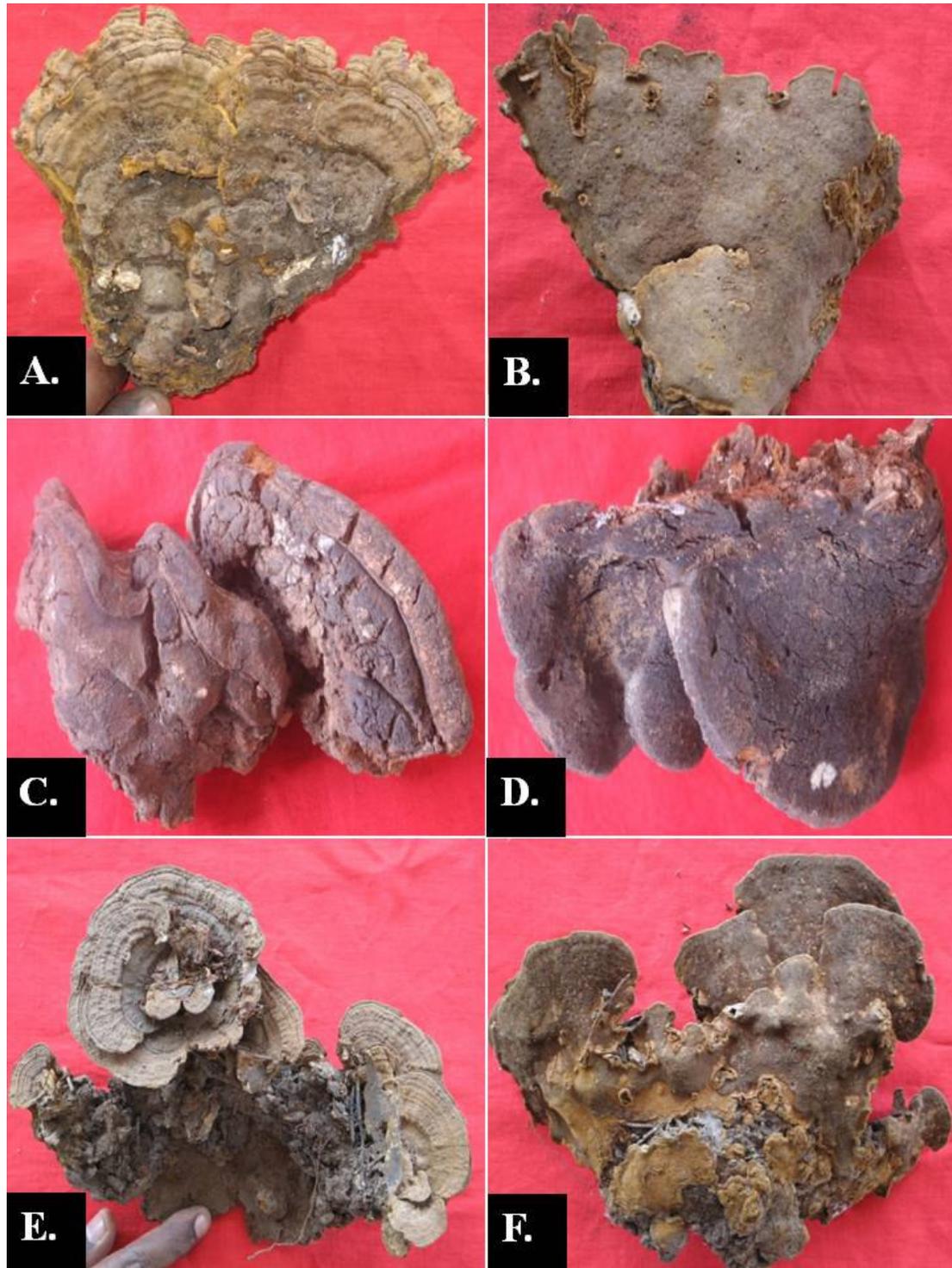


Figure 2. A) Pileal surface of *P. hoehnelii*, B) Hymenial surface with pores of *P. hoehnelii*, C) upper surface of *P. robustus*, D) lower surface of *P. robustus*, E) upper surface of *P. conchatus*, F) Lower surface of *P. conchatus*.

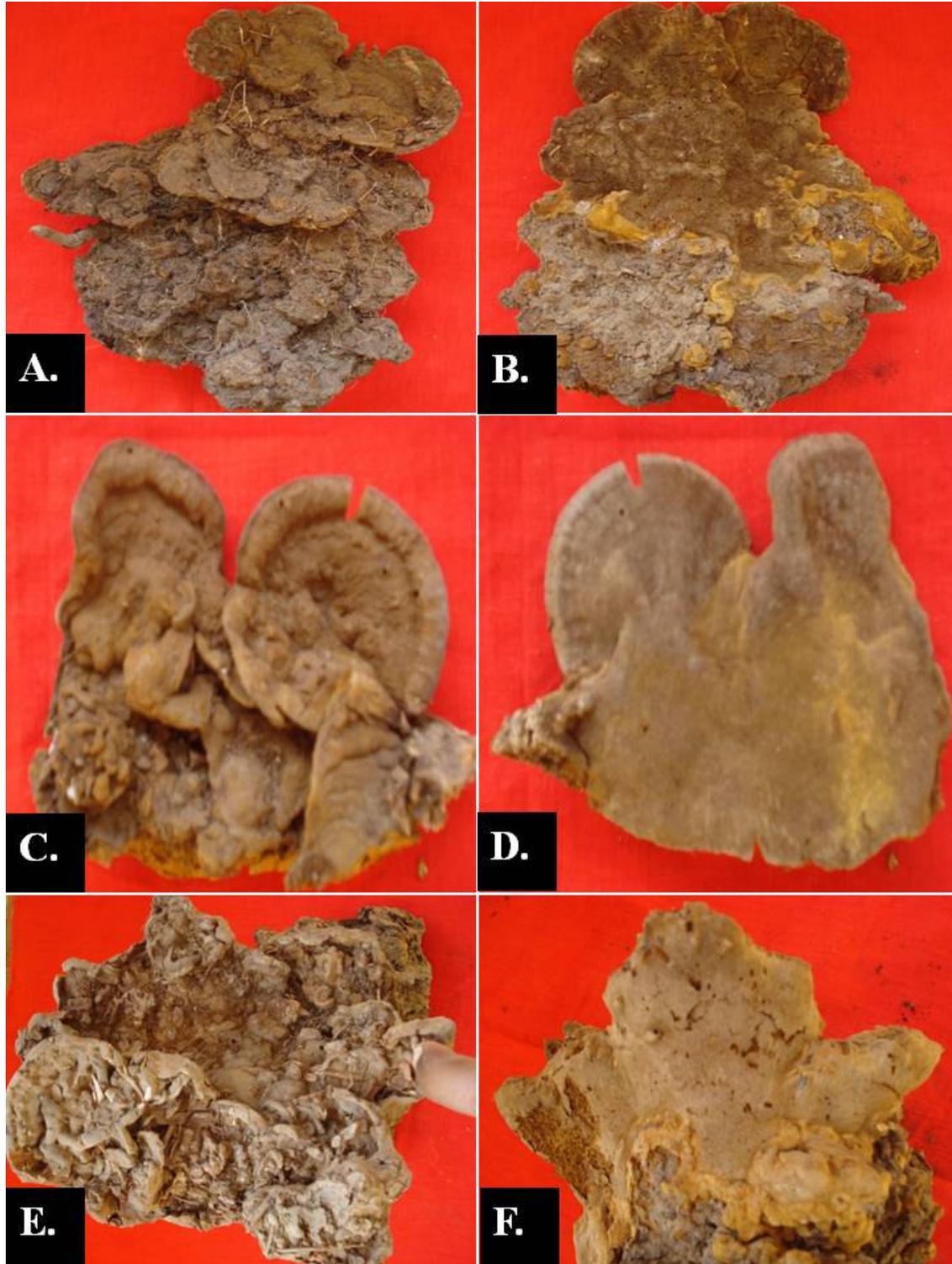


Figure 3. A) upper surface of *P. rhabbarinus*, B) Lower surface of *P. rhabbarinus*, C) Upper surface of *P. pachyphloeus*, D) Lower surface of *P. pachyphloeus*, E) Upper surface of *P. setulosus*, F) Lower surface of *P. setulosus*.

black, 2-7 mm thick crust. hyphal system dimitic; generative hyphae simple septate, thin walled, golden brown, 3.12 µm skeletal hyphae 6.32 µm wide, rusty brown, thick walled, branched, aseptate, setal hyphae present in context and dissepiments, frequent, ferruginous, thick walled up to 400 µm long, 6.32 µm wide, more straight, projecting obliquely into the hymenium and the tubes, tips acute; hymenial setae 30 x 6.5 µm, golden brown, ventricose, projecting 10 µm beyond the hymenium, mostly present near the base of tube; basidia 16 x 9.35 µm, clavate; spores abundant, subglobose, golden brown, slightly thick walled, 5.65 x 3.12 µm (Fig. 4F).

**Habitat:** found on living tree of *Peltophorum ferrugineum*. Form Vadia palace Rajpipla Gujarat collected by N. Praveen Kumar, Accession no: MSU Bot.103, 22-4-2007

It was causing white rot on living *Terminalia*. It was a rare species found in the tropical forests of Kerala and Arunachal Pradesh only (Sharma 1995). But in present study it was found on living tree of *Peltophorum ferrugineum* trunk causing white rot.

***Phellinus conchatus* (Persoon) Quélet, Enchiridion Fungorum: 173, 1886.**

***Boletus conchatus* Persoon, Ann. Bot. (Usteri) 15: 24, 1795.**

Basidiocarps perennial, sessile, imbricate, semicircular, convex, pileus up to 10.5 cm broad, 6 cm wide and 2 cm thick at base, woody hard; upper surface yellowish brown, tomentose, with age becoming black, glabrous with a distinct thick crust in narrow, sharp sulcate zones, finely cracked radially; margin rounded, wide, yellowish brown (Fig. 2E); pore surface dark brown; pores 6-8 per mm; tubes yellowish, indistinctly stratified (Fig. 2F); context golden brown, up to 3 mm thick with one black layer. Hyphal system dimitic; generative hyphae thin-walled, hyaline, septate, branched, 3.12 µm wide; skeletal hyphae golden brown, 6.23 µm wide, un-branched, thick-walled; hymenial setae abundant, 21.84 x 9.3 µm, ventricose, dark reddish brown, misshaped with irregular; tramal setae present, up to 40 µm long and 6.25 µm wide, straight; basidia 12.4 x 3.12 µm, clavate; basidiospores abundant, pale yellow, globose, uniguttulate 6.25 x 3.12 µm (Fig. 4I).

**Habitat:** found on living tree of *Peltophorum ferrugineum*. Form Vadia palace Rajpipla Gujarat collected by N. Praveen Kumar, Accession no: MSU Bot. 104, 22-4-2007

It was found frequently on dead branches of standing and living trees of *Salix* and *Pyrus Pashia*; less common on the dead woods of *Mangifera indica* in Calcutta (Bakshi 1971); *Cotoneaster beccariis*, *Mallotus philippinensis*; *Quercus incana* and *Q. semicarpifolia*, *Rhus*

*parviflora*, *R. punjabensis*, *Lyonia ovalifolia*, *Toona ciliate* and rarely also on the species of *Viburnum*, *Populus* and *Betula*. It causes whit rot and killing the branches and ultimately the entire trees (Sharma 1995). But in present paper it causes white rot on *Peltophorum ferrugineum*.

***Phellinus pachyphloeus* (Patouillard) Patouillard, Essai taxonomique: 97, 1900**

***Polyporus pachyphloeus* Patouillard, J. Bot. (Morot) 3: 257, 1889.**

Basidiocarps perennial, solitary, woody hard, light in weight on drying, applanate, broadly attached, sessile; pileus 20 cm broad, 16 cm wide and 10 cm thick; upper surface tomentose, reddish brown, thick heard crust, rugulose in wide concentric zones; irregularly cracking, light in weight on drying; margin obtuse, entire, persistently velutinate (Fig. 3C); pore surface grayish brown; tubes distinctly stratified, usually concolorous with context, up to 5 mm thick in each layer; pores small, invisible to naked eye, 8 pores per mm (Fig. 3D); context yellowish brown, with white mycelial strands, woody, 5 cm thick, limited black crust at upper surface. Hyphal system dimitic, generative hyphae hyaline, thin walled, 3.12 µm wide; skeletal hyphae thick walled, golden brown, 6.23 µm wide; setal hyphae present in context and dissepiments, dark brown, up to 200 µm long and 15 µm wide; tips pointed, thick walled, frequently projecting into the lumen of the tubes; hymenial setae present, projecting above the hymenium, thick walled, golden brown, ventricose, 28.5 x 18.32 µm; basidia clavate, 4 sterigmate, hyaline, 10.23 x 3.12 µm; spores globose, thin walled, rusty brown, 4.5 x 3.12 µm, non-amyloid, usually absent in dried herbarium specimens Fig. 4K).

**Habitat:** found on living tree of *Peltophorum ferrugineum*. Form Vadia palace Rajpipla Gujarat collected by N. Praveen Kumar, Accession no: MSU Bot.105, 22-4-2007

The basidiocarps are the largest among all the Indian Aphyllophoraceous fungi. It was found on both dead and living tree trunks and branches of *Ficus* and *Mangifera* and less frequently on species of *Anogeissus*, *Terminalia*, *Cassia*, *Bruguiera*, *Acer*, *Rhizophora*, *Albizia*, *Shorea* etc. causing a white stringy rot of sap wood and heart wood. The affected tree was usually killed on which the fungus continues development (Bakshi 1971). But in present paper it causes white rot in *Peltophorum ferrugineum* tree.

***Phellinus rhabarbarinus* (Berkeley) G. Cunningham, Bull. New Zealand Dept. Sci. Industr. Res. 164: 229, 1965.**

***Polyporus rhabarbarinus* Berkeley, Ann. Mag. Nat. Hist., 1 3: 388, 1839**

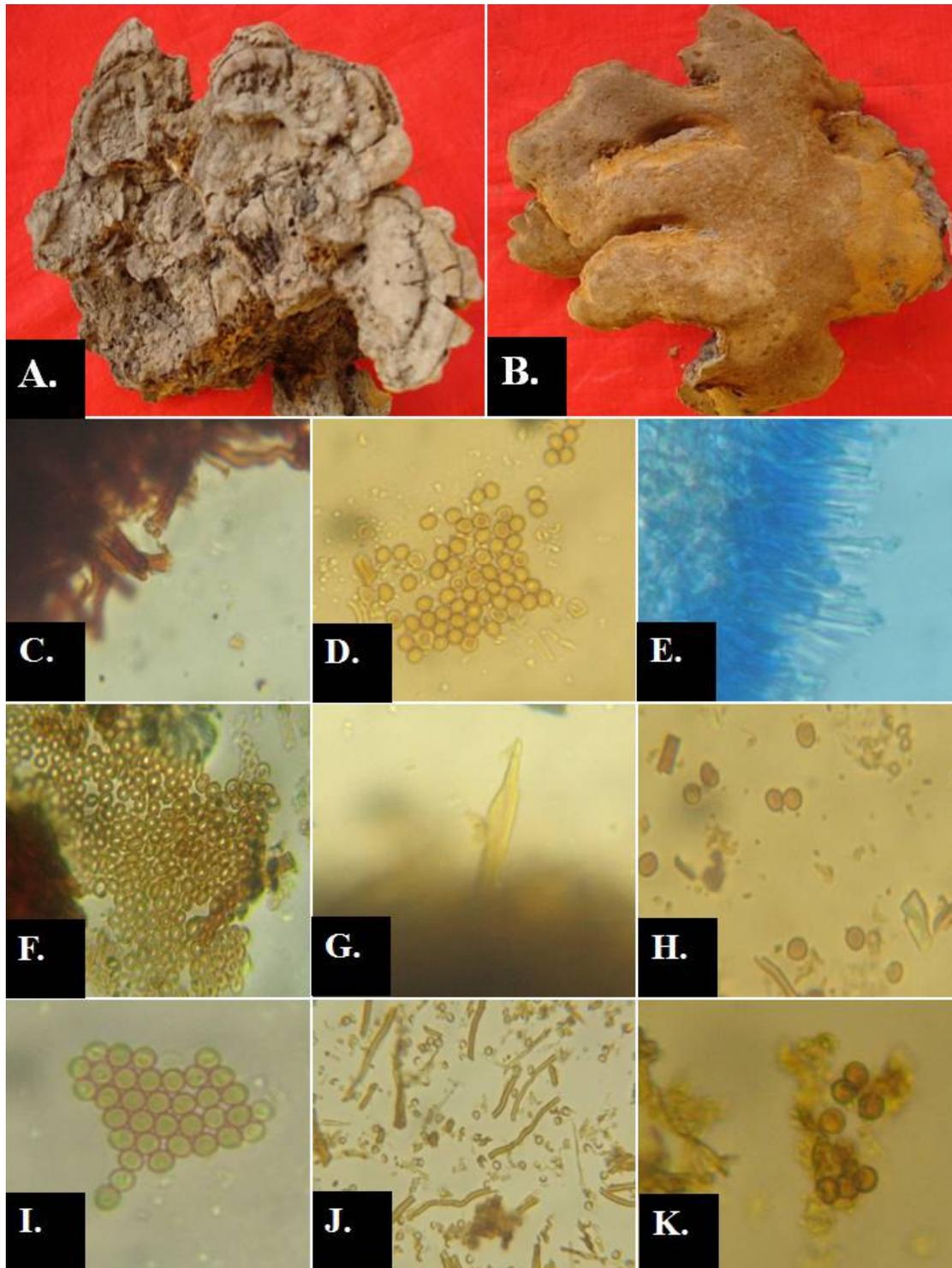


Figure 4. A) Upper surface of *P. caryophyllii*, B) Lower surface of *P. caryophyllii*, C) T.S. of Pore layer showing the Basidia and spores *P. caryophyllii*, D) Basidiospores of the *P. pectinatus*, E) T.S. of the hymenial layer showing the Basidia *G. sepiarum*, F) Basidiospores of the *P. hoehnelii*, G) Setae of the *P. robustus*, H) Basidiospores of the *P. robustus*, I) Basidiospores of *P. concatus*, J) showing the Skeletal, generative hyphae along with basidiospores of *P. rhabarbarinus*, K) Basidiospores of *P. pachyphloeus*.

Basidiocarps perennial, solitary, applanate, attached by a broad lateral base, elongated, 25 cm long, 28.5 cm wide, 3 cm thick at base, woody hard when dry; pileus glabrous, concentrically sulcate and zoneate, dark brown to black, with black crust; margin entire, matted tomentosed, lighter than the pileus (Fig. 3A), pore surface, dark reddish brown, tubes concolorous with pore surface, 4 mm deep in each layers indistinctly stratified, pores round, small, 7 per mm (Fig. 3B), context yellowish brown, fibrous, 5 mm thick at base; hyphal system dimitic, generative Hyphae thin walled, hyaline, 3.12  $\mu$ m wide; skeletal hyphae thick walled, golden brown, 6.25  $\mu$ m wide; hymenial setae abundant, rusty brown, ventricose, straight, thick walled 37.33x 12.48  $\mu$ m; basidia broadly clavate, hyaline, 12.48 x 6.25  $\mu$ m in size; basidiospores hyaline, subglobose, 3.12 x 2.5  $\mu$ m in diameter (Fig. 4J).

**Habitat:** found on living tree of *Peltophorum ferrugineum*. Form Vadia palace Rajpipla Gujarat collected by N. Praveen Kumar, Accession no: MSU Bot.107, 22-4-2007

It was found on dead hard woods causing a white rot, a rare topical to subtropical species. (Sharma 1995) and also found on logs of *Rhus Wallichii*, Kulu of Wesrern Himalayas (Bakshi 1971). It was causing white rot on living tree of *Peltophorum ferrugineum* in Vadia palace of Rajpipla, Gujarat.

***Phellinus setulosus* (Lloyd) Imazeki, Bull. Tokyo Sci. Mus. 6: 104, 1943.**

***Fomes setulosus* Lloyd, Syn. Fomes: 243, 1915.**

Basidiocarps perennial, imbricate, sessile, broadly attached, woody heard, applanate, unguulate, 24 cm long, 18 cm wide, 2 cm thick near the base; upper surface reddish brown slowly becoming black, finely tomentosed, slowly glabrous, concentrically zoned, sulcate, without crust; margin yellowish brown, thin, entire, velutinate (Fig. 3E); pore surface dark brown; tubes stratified, 3 mm deep in each layer, margin sterile; pores round 7 per mm (Fig. 3F); context reddish brown, lacking distinct cuticle above, fibrous, up to 5 mm thick; hyphal system dimitic, generative hyphae thin walled, simple septate, hyaline, 3.12  $\mu$ m wide, more yellowish in context; skeletal hyphae thick walled, golden brown, 6.25  $\mu$ m wide; hymenial setae abundant, ventricose, often strongly swollen at base, apex straight, dark brown, thick walled with narrow lumen, 21.38 x 9.36  $\mu$ m; basidia 15.6 x 6.25  $\mu$ m, clavate, 4 sterigmate; basidiospores pale yellow, globose, thin walled, 5.23 x 4.23  $\mu$ m in diameter.

**Habitat:** found on living tree of *Peltophorum ferrugineum*. Form Vadia palace Rajpipla Gujarat

collected by N. Praveen Kumar, Accession no: MSU Bot.108, 22-4-2007.

It was causing white pocket rot on dead angiosperm woods. It was also a rare species in the tropical forests (Sharma 1995). Bose (1937) Reported from Lokra hills of Assam. But in present study it was found on living tree of *Peltophorum ferrugineum* in Vadia palace of Rajpipla, Gujarat causing white rot.

***Phellinus caryophyllii* (Raciborski) G. Cunningham, Bull. New Zealand Dept. Sci. Industr. Res. 164: 238, 1965.**

***Trametes caryophyllii* Raciborski, Parasitische Algen und Pilze Java's 1: 17, 1900.**

Basidiocarp annual, effused- reflexed, semicircular, broadly attached, 17.5 cm long, 16.5 cm wide, 1 cm thick at base, woody heard; pilear surface rusty brown, velvety, soon glabrous with distinct black crust, narrow zones in sharp edges Fig. 4A); pore surface rusty brown, with sterile reddish brown border; tubes dark brown, distinctly stratified, 4 mm deep in each layer pores round, 6 per mm (Fig. 4B); context concolotous with tubes, limited on the upper surface by a black crust, 2 mm thick, hyphal system dimitic; generative hyphae hyaline, simple septate, branched, 3.12  $\mu$ m wide, skeletal hyphae golden brown thick walled, 2  $\mu$ m wide; hymenial setae none; basidia subclavate, 15.6 x 6.25  $\mu$ m; basidiospores pale yellow, globose, 3.5 x 2.1  $\mu$ m in diameter (Fig. 4C).

**Habitat:** found on living tree of *Peltophorum ferrugineum*. Form Vadia palace Rajpipla Gujarat collected by N. Praveen Kumar, Accession no: MSU Bot.109, 22-4-2007

It was a common and a serious sap and heart rot parasite on *Sal* and its associates like axlewood, sandan, kasi, jaman, bahera, *Cordia dichotoma* and causing white ring rot in initial stage and becomes white spongy in advanced decay (Bakshi 1971). But it causes white rot in the topical forests (Sharma 1995). In present study it causes white rot on living tree of *Peltophorum ferrugineum* in Vadia palace of Rajpipla, Gujarat.

***Phellinus badius* (Berk.: Cke) Cunn. New Zealand Dept. Sci. Ind. Res. Bull. 164:233, 1965.**

***Polyporus badius* Berk., Ann. Mag. Nat. Hist. 7:451**

Basidiocarp perennial, sessile, hoof shaped to unguulate easily detachable from host, 10 x 8 x 2 cm, head woody; pilear surface yellowish brown when young, brownish when maturity. Glabrous, weakly zoned, rimose, crust up to 0.2 mm thick margin obtuse, sterile, pore surface dark brown

glancing tubes ferruginous brown, paler than pore surface (Fig 1A), stratified distinctly, 3 mm deep in each layer pores 7 per mm angular, pore wall thick, context brown lustrous, corky when fresh hard on drying 1 – 5 mm thick faintly zoned, granular core of dull yellowish brown mycelium with patches of white mycelium and dark reddish brown, hard, glossy granules scattered throughout; hyphal system dimitic, skeletal hyphae thick-walled, narrow lumen 6.3  $\mu\text{m}$ ; generative hyphae pale yellow simple septate, moderately branched 3.12  $\mu\text{m}$  hymenial setae absent or very rarely present in older specimen ventricose, 15 -25 x 9.5  $\mu\text{m}$  dark reddish brown. Basidia broadly clavate 14 x 7  $\mu\text{m}$  4 sterigmata Basidiospores broadly ellipsoidal thick-walled 6.3 x 5.1  $\mu\text{m}$  golden brown dark reddish brown in KOH.

**Habitat:** found on living tree of *Peltophorum ferrugineum*. Form Vadia palace Rajpipla Gujarat collected by N. Praveen Kumar, Accession no: MSU Bot.102, 22-4-2007

A common, serious parasite causing heart rot in Khair from natural forests and plantations were observed. It causes white spongy rot in which the normal red colour of heart wood of Khair discolours to light sepia in the early stages of attack. In advanced decay, the wood becomes spongy and bleached. (Bakshi 1971). But in the present paper it causes white rot.

***Phellinus robustus* (Karst.) Bourd. & Galz. Bull. Soc. Mycol. France 41:188, 1925.**

***Fomes robustus* P. Karsten, Bidr. Känn. Finl. Nat. Folk 48: 467, 1889.**

Basidiocarp perennial, effused-reflexed or sessile, first cushion like then unguulate to applanate, 11 cm long 7.8 cm broad and 3 cm thick upper surface rusty brown to almost black first finely tomentosed, glabrous dull crusty, zoned in broad rounded sulcate bands margin rounded, glabrous black fertile below (Fig. 2C). Pore surface grayish brown tubes distinctly stratified 3 mm deep with thin layer of context in between pores small circular 5 per mm (Fig. 2D), context rusty brown shiny distinctly stratified woody hard, 3 mm thick, hyphal system dimitic, skeletal hyphae thick-walled with narrow lumen golden brown colour, rusty brown in trama 6.3  $\mu\text{m}$  broad. Generative hyphae thin walled, pale yellow, septate, branched, 4  $\mu\text{m}$ . hymenial setae rare to scattered, ventricose, thick walled, reddish brown 26.5 x 6.3  $\mu\text{m}$  tip acute Fig. 4G), cystidiolate hyaline narrowly clavate ventricose with tip elongated up to 100  $\mu\text{m}$  and projecting in tubes. Basidia clavate hyaline 12.5 x 6.3  $\mu\text{m}$ ; spores globose often apiculate, hyaline smooth 6.3 x 5.2  $\mu\text{m}$  in diameter. Strongly dextrinoid (Fig. 4H).

**Habitat:** found on the living trees of *Peltophorum ferrugineum* and dead tree of *Polyathia longifolia* from Vadia palace of Rajpipla and M. S. University of Baroda Gujrat. Collected by Prof. Arun Arya. Accession No: MSU Bot.110, 7-8-2007.

A parasite on fir and also on the stumps of spruce in the temperate region of western Himalayas were reported (Bakshi 1971). It was most common on living trees of *Abies pindrow*, *Picea smithiana* and less frequently on species of *Quercus*, *Salix*, *Acer*, *Juglans*, *Aesculus* and *Taxus*; causing white heart rot of living trees. It is widely spread, commonest species in temperate forests of Himalayas (Sharma 1995). But in present study it was observed from the tropical forests of Rajpipla, Gujarat.

#### ***Schizophyllum commune* Fr.**

It is called split gill fungi. The basidiocarps are fan shaped, 1- 4 cm in width. Basidiocarps were found attached on trunks of *Peltophorum ferrugineum*.

The basidiocarps have gills on lower surface which are of two lengths. These gills split when atmosphere is dry and protect the hymenium layer.

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