

# DIVERSITY OF POROID MUSHROOMS IN PUNJAB: FAMILY HYMENOGYAPHALES

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## ABSTRACT

The present paper deals with the diversity of poroid members of family *Hymenochaetaceae* in Punjab. Fourteen species belonging to four genera i.e. *Fuscoporia* (*F. gilva*), *Inocutis* (*I. rheades*), *Inonotus* (*I. patouillardii*) and *Phellinus* (*P. fastuosus*, *P. badius*, *P. xeranticus*, *P. grenadensis*, *P. rimosus*, *P. pectinatus*, *P. melleoporus*, *P. purpureogilvus*, *P. rhabarbarinus*, *P. robustus* and *P. conchatus*) are being described. Ten species are being described for the first time from the study area.

**Keywords:** *Basidiomycota*, *Agaricomycetes*, Punjab

## INTRODUCTION

Family *Hymenochaetaceae* (*Agaricomycetes*, *Hymenochaetales*) is characteristic in having resupinate to pileate, smooth to poroid basidiocarps, xanthochroic tissue, hyphae without clamps, presence/absence of setae, two to four sterigmate basidia and thin- to thick-walled basidiospores. Several taxa of the family are reported to be implicated in many diseases of broad-leaved and coniferous trees, causing various types of rots and diseases. A large number of the species have medicinal and nutritional importance [1].

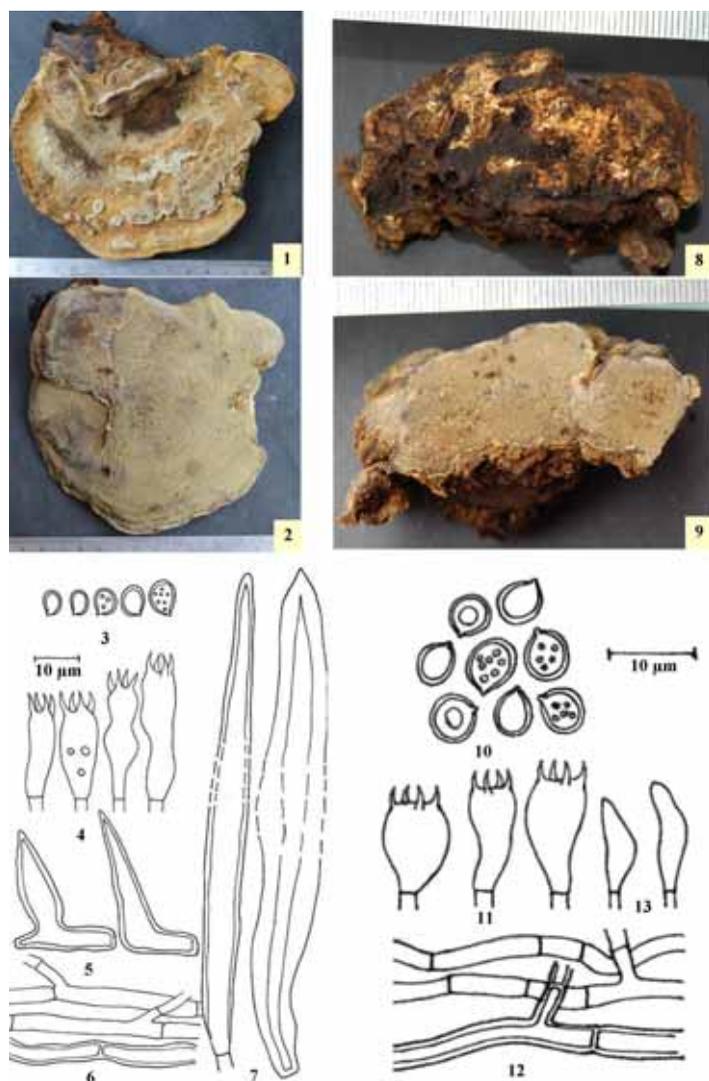
## OBSERVATIONS

Key to the genera

1. Hyphal system monomitic ..... 2
1. Hyphal system dimitic ..... 3
2. Setal structures present ..... *Inonotus*
2. Setal structures absent ..... *Inocutis*
3. Generative hyphae usually encrusted ..... *Fuscoporia*
3. Generative hyphae usually not encrusted ..... *Phellinus*

1. *Inonotus patouillardii* (Rick) Imazeki, Bulletin of the Tokyo Science Museum 6: 105, 1943. – *Polystictus patouillardii* Rick, Brotéria Série Botânica 6: 89, 1907. **Plate 1 (Figs. 1-7).**

**Basidiocarp** annual, pileate, applanate, solitary; pileus up to 15 × 7 × 4 cm; abhymenial surface smooth to tomentose, somewhat zonate, pale orange to greyish orange when fresh, brownish orange on drying; hymenial surface poroid, orange grey to brownish orange, when fresh, greyish orange to brown on drying; pores round, 3–4 per mm; dissepiments thin, entire; context up to 9 mm thick, light brown, homogeneous, fibrous; pore tubes up to 5 mm long, brownish orange; margins thinning, obtuse, wavy to irregular, sterile up to 5 mm, greyish orange on the hymenial surface, concolorous on the abhymenial surface. **Hyphal system** monomitic. Generative hyphae up to 5.0 μm wide, branched, simple septate, thin- to thick-walled, subhyaline to yellowish brown. **Setal hyphae** up to 115.0 × 15.2 μm, thick-walled, abundant, mostly horizontal in trama. **Setae** up to 33.0 × 8.8 μm, ventricose, thick-walled, dark brown. **Basidia** 30.0–36.0 × 7.2–9.8 μm, clavate to somewhat sinuous, subhyaline, with oily contents, simple septate at the base, 4–sterigmate; sterigmata up to 4.7 μm long. **Basidiospores** 5.2–7.6 × 4.0–5.8 μm, broadly ellipsoid, smooth, pale yellow, thick-walled, with oily contents, cyanophilous, inamyloid.



**Plate 1:** Figs. 1-7: *Inonotus patouillardii*: 1. basidiocarp showing abhymenial surface; 2. basidiocarp showing hymenial surface; 3. basidiospores; 4. basidia; 5. setae; 6. generative hyphae; 7. setal hyphae. Figs. 8-13 *Inocutis rheades*: 8. basidiocarp showing abhymenial surface; 9. basidiocarp showing hymenial surface; 10. basidiospores; 11. Basidia; 12. generative hyphae; 13. cystidioles.

**Collection examined** – Punjab: Patiala, Urban Estate Phase II, on *Alstonia* sp., Gurpreet 7062 (PUN), August 13, 2013.

**Remarks** – This species is characteristic in having smooth to tomentose abhymenial surface, conspicuous setal hyphae and broadly ellipsoid basidiospores. Earlier it has been reported from India by Sharma [2-4] and Harpreet [5]. However, it is being described for the first time from Punjab.

**2. *Inocutis rheades*** (Pers.) Fiasson & Niemelä, Karstenia 24: 25, 1984 – *Polyporus rheades* Pers., Mycologia Europaea 2: 69, 1825. **Plate 1 (Figs. 8-13).**

**Basidiocarp** annual, effused-reflexed to pileate, applanate; pileus up to 5.5 × 3 × 2 cm; abhymenial surface sulcate, indistinctly zonate, brownish yellow to brown to dark brown when fresh, greyish orange to dark brown on drying, with brownish-black, hard cutis; hymenial surface poroid, orange grey to greyish orange when fresh, brownish grey on drying; pores angular, 4–5 per mm; dissepiments thin, entire; context up to 5 mm thick, homogeneous, brownish yellow; pore tubes up to 2 mm long, stratified with greyish brown zone near the context layer and dark brown zone towards hymenial surface; margins obtuse, wavy to irregular, sterile up to 1 mm, concolorous on both hymenial and abhymenial surfaces.

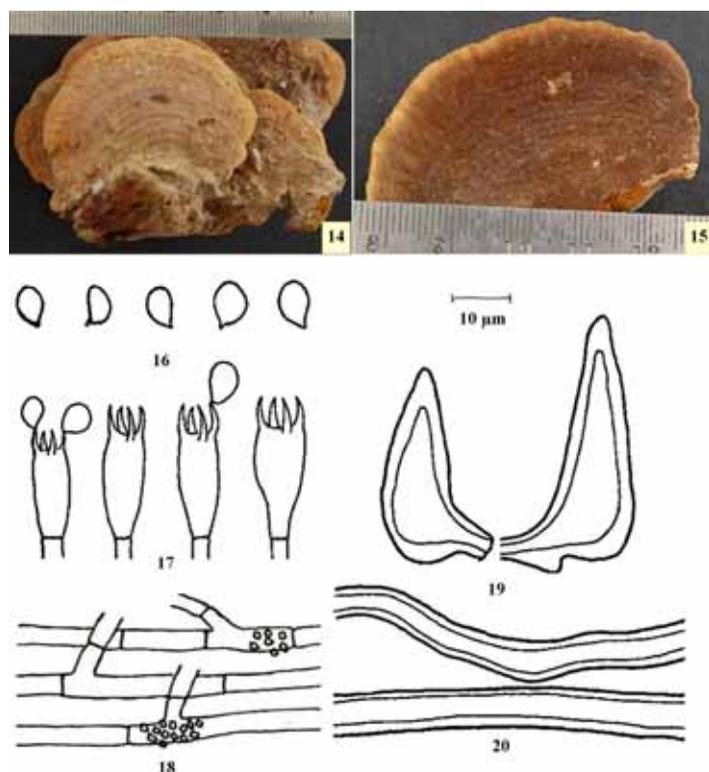
**Hyphal system** monomitic. Generative hyphae up to 3.4 μm wide, branched, simple septate, thin- to thick-walled. **Setal hyphae** absent. **Setae** absent. **Cystidioles** 10–12.5 × 3–3.7 μm, fusoid, thin-walled, simple septate at the base. **Basidia** 10.6–13.5 × 5.6–7.5 μm, clavate to subclavate, subhyaline, simple septate at the base, 4–sterigmate; sterigmata up to 2 μm long. **Basidiospores** 5–6.5 × 4.3–5.7 μm, broadly ellipsoid to subglobose, smooth, dark brown, thick-walled, with oily contents, inamyloid, acyanophilous.

**Collection examined** – Chandigarh (UT): lake reserve forest, on angiospermous stump, Dhingra and Gurpreet 7063 (PUN), August 15, 2013.

**Remarks** – *Inocutis rheades* is characteristic in having sulcate abhymenial surface with brownish–black, hard cutis, absence of setal structures and broadly ellipsoid to subglobose basidiospores. Earlier it has been reported from India by Sharma [6, 7] as *Inonotus rheades*. The present collection is different from the earlier descriptions from India in lacking the granular core and is a new report for the study area.

**3. *Fuscoporia gilva*** (Schwein.) T. Wagner & M. Fisch., Mycologia 94(6): 1013, 2002. – *Boletus gilvus* Schwein., Schriften der Berlinische Gesellschaft Naturforschender Freunde 1: 96, 1822. **Plate 2 (Figs. 14-20).**

**Basidiocarps** annual, pileate, imbricate; pileus 7.0 × 4 × 0.7 cm, hard; abhymenial surface strigose to hirsute, faintly zonate to azonate, light orange to orange when fresh, brownish orange to light brown on drying; hymenial surface poroid, greyish red to reddish brown when fresh, brown on drying; pores round to angular, 6–9 per mm; dissepiments entire; context up to 5 mm thick, brownish yellow to brownish orange; pore tubes up to 4 mm long, brown; margins thinning,



**Plate 2:** Figs. 14-20: *Fuscoporia gilva*: 14. basidiocarp showing abhymenial surface; 15. basidiocarp showing hymenial surface; 16. basidiospores; 17. basidia; 18. generative hyphae; 19. setae.

acute, entire to somewhat wavy, sterile up to 1 mm, concolorous on the hymenial surface, paler concolorous on the abhymenial surface. **Hyphal system** dimitic. Generative hyphae up to 3 µm wide, simple septate, subhyaline, thin-walled, frequently branched, encrusted; thin-to somewhat thick-walled. Skeletal hyphae up to 4.1 µm wide, rarely branched, aseptate, thick-walled, yellowish brown. **Setae** 17.0–23.0 × 7.0–7.6 µm, subulate, acuminate, thick-walled, dark brown in 3% KOH solution, projecting up to 20 µm out of hymenium. **Basidia** 8.0–10.5 × 3.5–4.7 µm, clavate to subclavate, subhyaline, simple septate at the base, 4-sterigmate; sterigmata up to 2.4 µm long. **Basidiospores** 3.5–4.7 × 2.0–3.3 µm, ellipsoid, smooth, thin-walled, subhyaline, inamyloid, acyanophilous.

**Collection examined** – Punjab: Hoshiarpur, Panyali Khurd, on angiospermous stump, Gurpreet 7061 (PUN), August 2, 2013.

**Remarks** – A fairly common species in India, reported earlier by Bose [8-10], Banerjee [11], Thind and Chatrath [12], Dhanda [13], Singh [14], Bakshi [15], Sharma [16, 2, 7], and Leelavathy and Ganesh [17]. However, it is a new record for the study area.

### Key to the species of *Phellinus*

1. Setae present ..... 2
1. Setae absent ..... 5
2. Setal hyphae present ..... *P. conchatus*
2. Setal hyphae absent ..... 3
3. Basidiocarps pileate ..... *P. rhabarbarinus*
3. Basidiocarps resupinate ..... 4
4. Cystidioles present ..... *P. pupureogilvus*
4. Cystidioles absent ..... *P. xeranticus*
5. Basidiocarps resupinate ..... *P. melleoporus*
5. Basidiocarps pileate ..... 6
6. Pilear surface rimose ..... 7
6. Pilear surface not as above ..... 8
7. Pilear surface deeply cracked forming polygonal woody scales with age ..... *P. rimosus*
7. Pilear surface not deeply cracked, no polygonal scales ..... *P. badius*
8. Basidiospores dextrinoid ..... *P. robustus*
8. Basidiospores not dextrinoid ..... 9
9. Basidiospores subglobose, basidiocarps concentrically sulcate ..... *P. fastuosus*
9. Basidiospores broadly ellipsoid, basidiocarps not as above ..... 10
10. Cutis present ..... *P. grenadensis*
10. Cutis absent ..... *P. pectinatus*

**4. *Phellinus conchatus*** (Pers.) Quél., Enchiridion Fungorum in Europa media et praesertim in Gallia Vigentium: 173, 1886. – *Boletus conchatus* Pers., Annalen der Botanik (Usteri) 15: 24, 1795. **Plate 3 (Figs. 21-27).**

**Basidiocarp** perennial, pileate, suborbicular, sessile, solitary; pileus up to 27 × 21 × 15 cm; abhymenial surface sulcate, indistinctly zonate, greyish orange to orange grey to brownish orange when fresh, brownish orange to brown on drying; hymenial surface poroid, greyish orange to brownish grey to brown when fresh, light brown to brown on drying; pores round, 7–8 per mm; dissepiments thin, entire; pore tubes up to 1.6 cm long, stratified, brown, separated by thin, homogeneous, brown context layers, up to 4 mm thick; margins indeterminate. **Hyphal system** dimitic. Generative hyphae up to 3.4 μm wide, simple septate, subhyaline, thin-walled, frequently branched. Skeletal hyphae up to 4.7 μm wide, aseptate, thick-walled, unbranched, dark brown. **Setal hyphae** up to 16.5 μm wide, thick-walled. **Setae** 22.0–57.0 × 7.0–8.0 μm, abundant, subulate to ventricose, thick-walled, reddish brown. **Basidia** not seen. **Basidiospores** 5.0–6.3 × 4–5.1 μm, ovoid to subglobose, smooth, thick-walled, pale brown, inamyloid, acyanophilous.

**Collection examined** – Punjab: Ludhiana, S.C.D. Government college, on the base of *Melia azedarach*, Gurpreet and Avneet 7071 (PUN), September 8, 2013.

**Remarks** – This species is characterized by the presence of setal hyphae, setae and ovoid to subglobose basidiospores. Earlier, this species has been reported by Bose [18], Banerjee [11], Bakshi [15] as *Fomes conchatus*, whereas by Sharma [6, 7] and Kuldeep Lalji [19] as *Phellinus conchatus*. Presently it is being reported for the first time from Punjab.

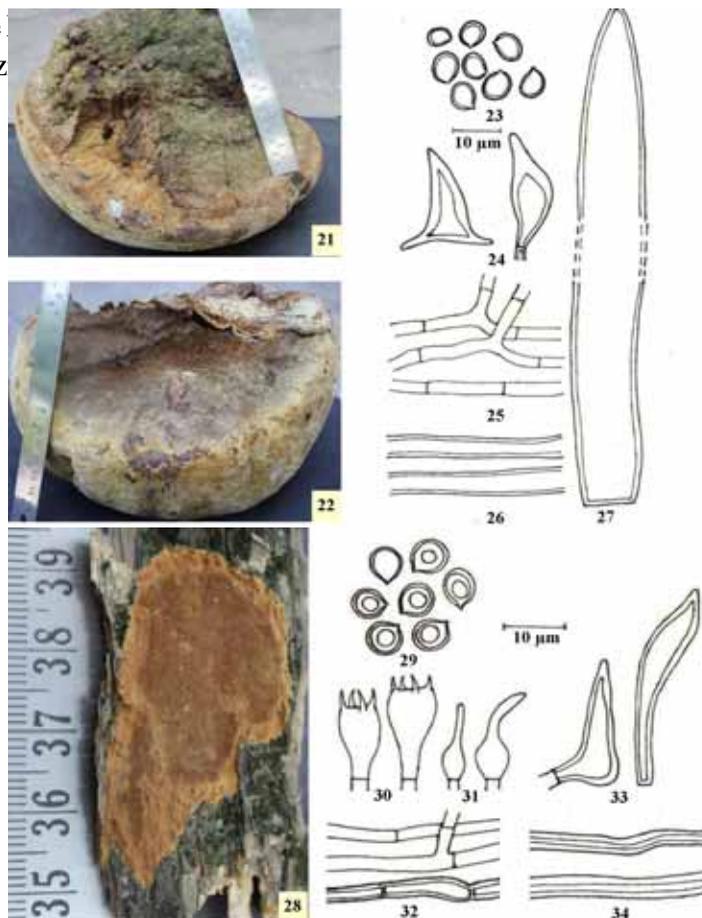
**5. *Phellinus rhabarbarinus*** (Berk.) G. Cunn., Bulletin of the 1965. – *Polyporus rhabarbarinus* Berk., Annals and Magaz

**Collection examined** – Punjab: Patiala, Punjabi University campus, on the trunk of *Cassia fistula*, Gurpreet 7066 (PUN), October 6, 2013.

**Remarks** – *P. rhabarbarinus* is characteristic in having perennial, solitary, applanate, sulcate, glabrous basidiocarps, brownish context and smaller (3.7–5 × 2.1–3.1 μm) ellipsoid basidiospores. Earlier, it has been reported from Punjab by Kuldeep Lalji [19].

**6. *Phellinus purpureogilvus*** (Petch) Ryvardeen, Norwegian Journal of Botany 19: 235, 1972. – *Poria purpureogilva* Petch, Annals of the Royal Botanic Gardens Peradeniya 6 (2): 138, 1916. **Plate 3 (Figs. 28-34).**

**Basidiocarp** annual, resupinate, not easily separable, up to 2 mm thick; pore surface light brown when fresh, brown on drying, uneven, pores round to angular, 5–6 per mm, dissepiments thin, entire, tubes not stratified, brown; margins thinning, fibrillose to irregular, whitish to paler concolorous, to indeterminate. **Hyphal system** dimitic. Generative hyphae up to 2.5 μm wide, simple septate, hyaline, thin-walled, branched. Skeletal hyphae up to 3.7 μm wide, aseptate, thick-walled. **Setae** 13.0–37.0 × 5.6–8.7 μm, subulate, apex pointed, thick-walled, dark brown. **Cystidioles** 15.0–16.2 × 4.3–5.6 μm, fusoid, subhyaline, thin-walled, simple septate at the base. **Basidia** 12.5–15.6 × 6.2–8.1 μm, clavate, subhyaline, simple septate at the base, 4-sterigmate;



**Plate 3:** Figs. 21-27: *Phellinus conchatus*: 21. basidiocarp showing abhymenial surface; 22. basidiocarp showing hymenial surface; 23. basidiospores; 24. setae; 25. generative hyphae; 26. skeletal hyphae; 27. setal hyphae. Figs 28-34: *Phellinus purpureogilvus*: 28. basidiocarp showing hymenial surface; 29. basidiospores; 30. basidia; 31. cystidioles; 32. generative hyphae; 33. setae; 34. skeletal hyphae.

sterigmata up to 3.4  $\mu\text{m}$  long. **Basidiospores** 5.6–6.2  $\times$  5.0–5.6  $\mu\text{m}$ , broadly ellipsoid to subglobose, smooth, thick-walled, inamyloid, acyanophilous.

**Collection examined** – Punjab: Patiala, Punjabi University campus, on angiospermous log, Gurpreet 7064 (PUN), August 2, 2013.

**Remarks** – This species is characterised by resupinate basidiocarps and presence of subulate setae. Earlier, it has been reported by Sharma and Ghosh [20] and Sharma [7]. However, it is being reported for the first time from Punjab.

**7. *Phellinus xeranticus*** (Berk.) Pegler, Kew Bulletin 21 (1): 44, 1967. – *Polyporus xeranticus* Berk., Hooker's Journal of Botany and Kew Garden Miscellany 6: 161, 1854. **Plate 4 (Figs. 35-40).**

**Basidiocarp** annual, resupinate, widely effused, not easily separable, up to 2 mm thick; pore surface greyish red to brown when fresh, not changing much on drying, uneven, pores angular, 5–7 per mm, dissepiments lacerate, tubes not stratified, brown, up to 2 mm long; margins thinning, whitish to paler concolorous, to indeterminate. **Hyphal system** dimitic. Generative hyphae up to 2.5  $\mu\text{m}$  wide, simple septate, subhyaline, thin-walled, branched. Skeletal hyphae up to 3.4  $\mu\text{m}$  wide, aseptate, thick-walled, yellowish brown. **Setae** 26.0–58.0  $\times$  6.8–8.8  $\mu\text{m}$ , subulate, abundant, apex pointed, thick-walled, dark brown. **Basidia** 13.0–15.0  $\times$  5.0–5.6  $\mu\text{m}$ , clavate, subhyaline, simple septate at the base, 4–sterigmate; sterigmata up to 2.8  $\mu\text{m}$  long. **Basidiospores** 4.3–5.9  $\times$  2.5–3.7  $\mu\text{m}$ , ellipsoid, hyaline, smooth, thin-walled, with oily contents, weakly cyanophilous, inamyloid.

**Collection examined** – Punjab: Ludhiana, Punjab Agricultural University, on *Dalbergia sissoo*, Gurpreet 7068 (PUN), September 8, 2013.

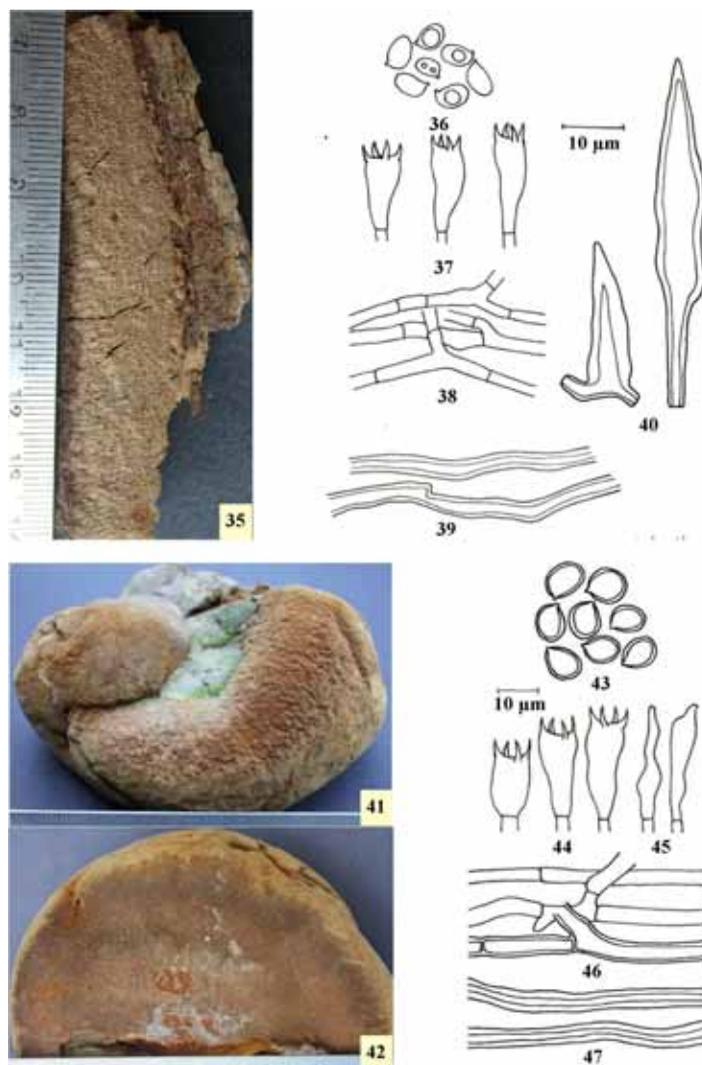
**Remarks** – *P. xeranticus* is peculiar in having abundant subulate setae. Earlier, from India, it has been reported by Bose [10], Banerjee [11], Pegler [21], Rattan [22], Dhanda [13], Thind and Dhanda [23, 24], Sharma [16], Singh [14], Sharma [6] and Kuldeep Lalji [19]. However, it is being reported for the first time from Punjab.

**8. *Phellinus melleoporus*** (Murrill) Ryvardeen, Mycotaxon 23: 177, 1985. – *Fomitiporella melleopora* Murrill, North American Flora 9 (1): 13, 1907.

**Collection examined** – Punjab: Patiala, Botanic Gardens, Punjabi University, on bark of *Pongamia* sp., Gurpreet 7067 (PUN), September 6, 2013.

**Remarks** – It is characteristic in having resupinate, yellowish brown basidiocarp, absence of setae and small (3.2–4.2  $\times$  2.3–3.2  $\mu\text{m}$ ), pale brown basidiospores. Earlier, Dargan et al. [25] reported it from the study area.

**9. *Phellinus rimosus*** (Berk.) Pilát, Annales Mycologici 38 (1): 80, 1940. – *Polyporus rimosus* Berk., London Journal of Botany 4: 54, 1845.



**Plate 4:** Figs. 35-40: *Phellinus xeranticus*: 35. basidiocarp showing hymenial surface; 36. basidiospores; 37. basidia; 38. generative hyphae; 39. skeletal hyphae; 40. setae. Figs. 41-47: *Phellinus robustus*: 41. basidiocarp showing abhymenial surface; 42. basidiocarp showing hymenial surface; 43. basidiospores; 44. basidia; 45. cystidioles; 46. generative hyphae; 47. skeletal hyphae.

**Collection examined** – Chandigarh (UT): Sector 1, backside of Sukhna Lake, on the trunk of *Acacia* sp., Dhingra 7070 (PUN), September 19, 2013.

**Remarks** – It is characterized by pileate basidiocarps, abhymenial surface deeply cracked, forming polygonal woody scales with age. Earlier, Kuldeep Lalji [19] reported it from the study area.

**10. *Phellinus badius*** (Cooke) G. Cunn., Bulletin of the New Zealand Department of Industrial Research 164: 233, 1965. – *Fomes badius* Cooke, Grevillea 14 (69): 18, 1885.

**Collection examined** – Punjab: Roopnagar, Balachaur, Maili, on angiospermous log, Avneet 7060 (PUN), September 22, 2013.

**Remarks** – It is peculiar in having pileate basidiocarps with rimose pilear surface and broadly ellipsoid to subglobose basidiospores. Earlier, it has been reported from the study area by Kuldeep Lalji [19].

**11. *Phellinus robustus*** (P. Karst.) Bourdot & Galzin, Bulletin de la Société Mycologique de France 41: 188, 1925. – *Fomes robustus* P. Karst., Bidrag till Kännedom av Finlands Natur och Folk 48: 467, 1889. **Plate 4 (Figs. 41-47).**

**Basidiocarp** perennial, pileate, applanate, suborbicular, solitary; pileus up to 14.0 × 11 × 7.5 cm; abhymenial surface smooth to tomentose, azonate, yellowish brown to light brown when fresh, light brown to brown on drying; hymenial surface poroid, brown when fresh, not changing much on drying; pores round to angular, 4–5 per mm; dissepiments entire; pore tubes stratified, up to 5 mm long, separated by very thin layers of context, up to 5 mm thick; margins indeterminate.

**Hyphal system** dimitic. Generative hyphae up to 3.1  $\mu$ m wide, branched, simple septate, thin-walled, subhyaline. Skeletal hyphae up to 3.4  $\mu$ m wide, rarely branched, aseptate, thick-walled, yellowish brown. **Setae** absent. **Cystidioles** 17.0–19.3 × 3.4–3.8  $\mu$ m, fusoid, thin-walled, with tapering apex. **Basidia** 8.7–14.3 × 5.3–5.7  $\mu$ m, clavate, subhyaline, simple septate at the base, 4-sterigmate; sterigmata up to 1.8  $\mu$ m long. **Basidiospores** 5.0–6.2 × 3.7–5.7  $\mu$ m, broadly ellipsoid to subglobose, thick-walled, smooth, yellowish brown, acyanophilous, dextrinoid.

**Collection examined** – Punjab: Patiala, Punjabi University campus, on trunk of *Cassia* sp., Gurpreet 7058 (PUN), September 18, 2013.

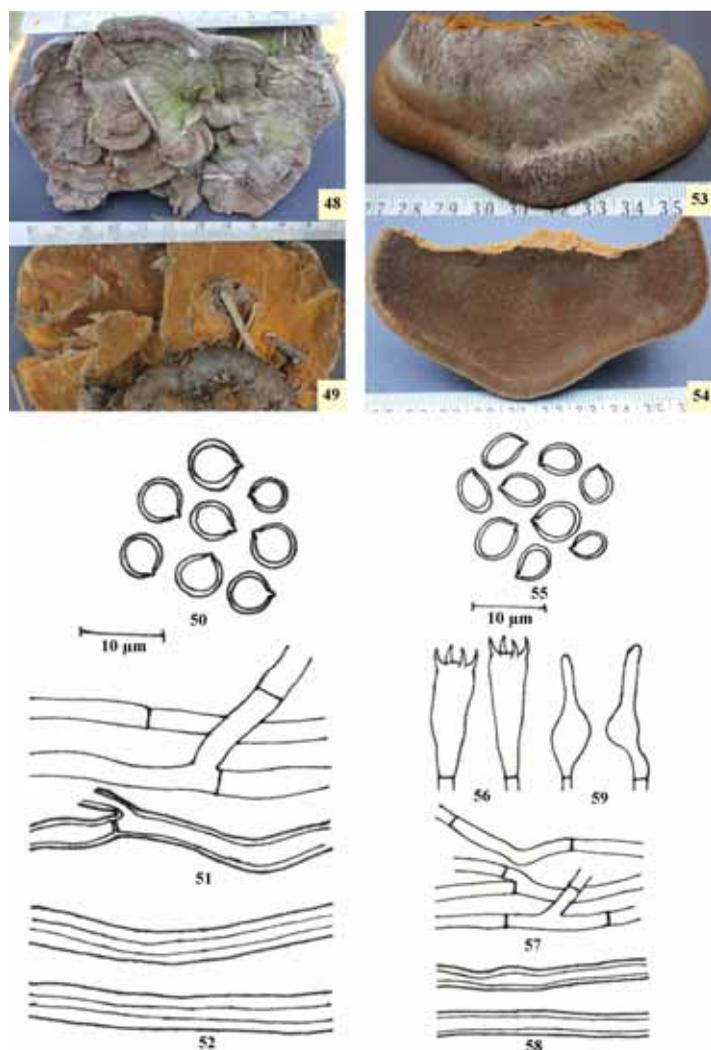
**Remarks** – *P. robustus* is characterised by very thick, applanate, suborbicular basidiocarp, smooth to tomentose abhymenial surface and absence of setal structures. From India, it has earlier been reported by Bakshi [15], Dhanda [13] and Sharma [16, 6, 7], Singh [14] and Harpreet [5] from different areas. However, it is being reported as a new record for the study area.

**12. *Phellinus fastuosus*** (Lév.) S. Ahmad, *Basidiomycetes* of West Pakistan: 56, 1972. – *Polyporus fastuosus* Lév., Annales des Sciences Naturelles Botanique 2: 190, 1844. **Plate 5 (Figs. 48-52).**

**Basidiocarps** perennial, pileate, imbricate, woody; pileus up to 15 × 12 × 1 cm; abhymenial surface sulcate, concentrically zonate, brownish grey to light brown when fresh, not changing much on drying; hymenial surface poroid, brownish orange to light brown to brown when fresh, brown on drying; pores round, 8–9 per mm, dissepiments entire; context up to 1.5 mm thick, homogeneous, brownish yellow; pore tubes up to 5 mm long, brownish orange; margins thinning, obtuse, irregular, sterile up to 9 mm, greyish brown on the hymenial surface, concolorous on the abhymenial surface. **Hyphal system** dimitic. Generative hyphae up to 3.4  $\mu$ m wide, branched, simple septate, thin- to thick-walled. Skeletal hyphae up to 4.0  $\mu$ m wide, rarely branched, aseptate, thick-walled, yellowish brown. **Basidia** not observed. **Basidiospores** 3.4–5.7 × 2.8–4.5  $\mu$ m, subglobose, thick-walled, smooth, brown, acyanophilous, inamyloid.

**Collections examined** – Punjab: Patiala, Baradari gardens, on base of *Eucalyptus* sp., Gurpreet 7065 (PUN), February, 10, 2013.

**Remarks** – Chief features of this species are sulcate, concentrically zonate abhymenial surface, absence of hymenial setae and subglobose basidiospores. Previously it has been reported from India by Bose [26], Banerjee [11], Saxena [27],



**Plate 5:** Figs. 48-52: *Phellinus fastuosus*: 48. basidiocarp showing abhymental surface; 49. basidiocarp showing hymenial surface; 50. basidiospores; 51. generative hyphae; 52. skeletal hyphae. Figs. 53-59: *Phellinus grenadensis*: 53. basidiocarp showing abhymental surface; 54. basidiocarp showing hymenial surface; 55. basidiospores; 56. basidia; 57. generative hyphae; 58. skeletal hyphae; 59. cystidioles.

**Remarks** – This species is characteristic in having applanate, unguulate basidiocarp and absence of setae. From India, it has earlier been reported by Dhanda [13] and Sharma [7]. Here it is being reported for the first time from Punjab.

**14. *Phellinus pectinatus*** (Klotzsch) Quél., *Enchiridion Fungorum in Europa media et praesertim in Gallia Vigentium*: 173, 1886 – *Polyporus pectinatus* Klotzsch, *Linnaea* 8: 485, 1833. **Plate 6 (Figs. 60-66).**

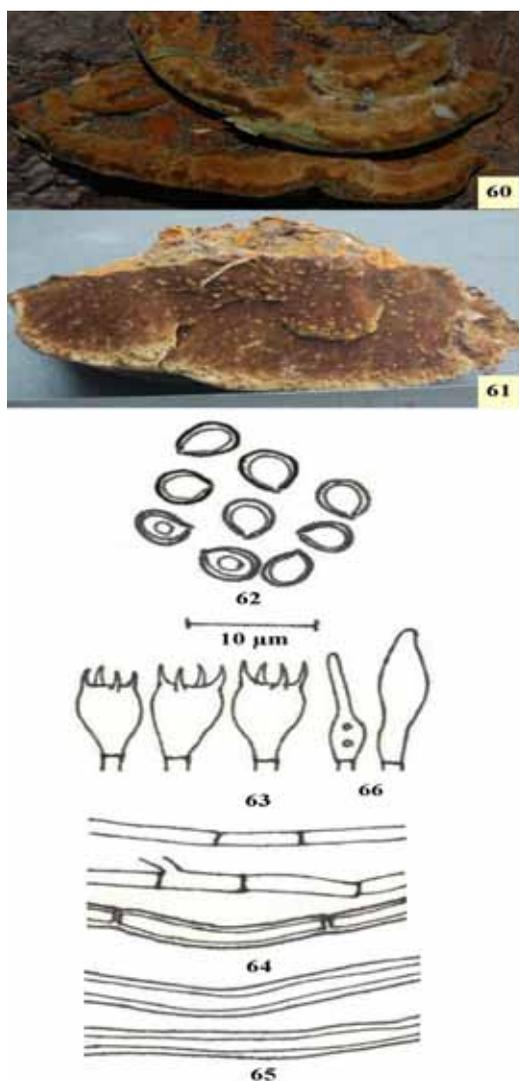
**Basidiocarps** perennial, pileate, imbricate, woody; pileus up to 5.5 × 5 × 3 cm; abhymental surface irregularly sulcate, light brown to brown to dark brown when fresh, not changing much on drying; hymenial surface poroid, light brown to brown when fresh, not changing much on drying; pores round to angular, 7–8 per mm; dissepiments entire; context up to 2.5 cm thick, homogeneous, hard, yellowish brown; pore tubes up to 5 mm long, golden yellow; margins thinning, obtuse, sterile up to 4 mm, deep yellow on hymenial surface, concolorous on abhymental surface. **Hyphal system** dimitic. Generative hyphae up to 2.2 μm wide, branched, simple septate; thin- to thick-walled, yellowish brown. Skeletal hyphae up to 3.1 μm wide, aseptate, thick-walled, rarely branched, brown. **Setae** absent. **Cystidioles** 13.7–16.5 × 3.0–3.7 μm, fusoid, subhyaline, thin-walled, simple septate at the base. **Basidia** 8.0–8.7 × 5–5.6 μm, subovate, simple septate at the base, 4–

Singh *et al.* [28] as *Fomes fastuosus* and by Dhanda [13], Sharma and Ghosh [20], Leelavathy and Ganesh [20] and Sharma [7] as *Phellinus fastuosus*. However, it is being reported for the first time from Punjab.

**13. *Phellinus grenadensis*** (Murrill) Ryvarden, *Norwegian Journal of Botany* 19: 234, 1972. – *Pyropolyporus grenadensis* Murrill, *North American Flora* 9 (2): 107, 1908. **Plate 5 (Figs. 53-59).**

**Basidiocarp** perennial, pileate, applanate, unguulate, solitary; pileus up to 10.5 × 7 × 4 cm; abhymental surface smooth to rugose, zonate, greyish orange to light brown to pale red when fresh, not changing much on drying, with brown cutis; hymenial surface poroid, light brown to brown when fresh, not changing much on drying; pores round, 3–4 per mm; dissepiments entire; context up to 2.5 cm thick, zonate, fibrous, light brown; pore tubes up to 1.5 cm long, brown; margins acute, somewhat incurved, sterile up to 3 mm, light brown on the hymenial surface, concolorous on the abhymental surface. **Hyphal system** dimitic. Generative hyphae up to 2 μm wide, branched, simple septate, thin-walled. Skeletal hyphae up to 3.7 μm wide, rarely branched, aseptate, thick-walled, yellowish brown. **Setae** absent. **Cystidioles** 17.8–18.7 × 4.3–5.3 μm, fusoid, with tapering apex, thin-walled. **Basidia** 15.6–20.6 × 5.0–5.6 μm, clavate, subhyaline, simple septate at the base, 4–sterigmate; sterigmata up to 2.2 μm long. **Basidiospores** 5.0–6.8 × 3.4–5.3 μm, broadly ellipsoid, thick-walled, smooth, yellowish brown, acyanophilous, inamyloid.

**Collection examined** – Punjab: Patiala, near Gol market, Punjabi University, on angiospermous stump, Gurpreet 7069 (PUN), September 15, 2013.



**Plate 6:** Figs. 60–66: *Phellinus pectinatus*: 60. basidiocarp showing abhymenial surface; 61. basidiocarp showing hymenial surface; 62. basidiospores; 63. basidia; 64. generative hyphae; 65. skeletal hyphae; 66. cystidioles.

sterigmate; sterigmata up to 2 μm long. **Basidiospores** 4.2–5 × 3–4 μm, broadly ellipsoid, smooth, pale yellow to brownish, thin- to somewhat thick-walled, weakly cyanophilous, inamyloid.

**Collection examined** – Chandigarh (UT): Lake reserve forest, on base of *Acacia* sp., Gurpreet & Dhingra 7059 (PUN), September 14, 2013.

**Remarks** – It has earlier been reported by Bose [2, 9], Banerjee [1], Thind and Chatrath [12], Dhanda [13], Sharma and Ghosh [20], Sharma [7] and Harpreet [5]. Here it is being reported for the first time from the study area.

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