

Checklist of microfungi of Biligiri Rangaswamy Temple Wildlife Sanctuary, Karnataka, India

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Manuscript received: 27 May 2024. Revision accepted: 20 August 2024.

Abstract. Dubey R, Chatterjee SS, Pandey AD. 2024. Checklist of microfungi of Biligiri Rangaswamy Temple Wildlife Sanctuary, Karnataka, India. *Intl J Trop Drylands* 25: 69-82. Biligiri Rangaswamy Temple Wildlife Sanctuary (BRT WLS) situated at the confluence of Eastern and Western Ghats, India, exhibits a unique blend of climatic and ecological conditions that support a rich and diverse biota. The present study aims to investigate its microfungal diversity and was conducted from 2014 to 2016. Fungi were collected from various substrates including plant litter, living leaves, and rhizospheric soil (rs). Identification of these fungi involved routine microscopic techniques, supplemented by advanced Scanning Electron Microscopy (SEM) for rare and novel fungi. The study resulted in a significant checklist of a total of 290 fungal isolates, categorized into 164 species across 114 genera. Among these, five taxa were newly discovered, including 1 new genus viz., *Biligiriella* S. Sengupta & Rashmi Dubey along with its type species *Biligiriella indica* S. Sengupta & Rashmi Dubey; and 3 other new species viz., *Colemaniella biligiriensis* Rashmi Dubey & S. Sengupta, *Elotespora indica* Rashmi Dubey & S.S. Chatterjee, *Sporidesmium biligiriense* Rashmi Dubey & S. Sengupta.

Keywords: Arbuscular mycorrhizal fungi, foliicolous fungi, fungal diversity, Karnataka, litter fungi, morphology, SEM studies, soil fungi, wild life sanctuary

INTRODUCTION

Karnataka is the seventh largest province of India, covering an area of 191,791 km² accounting for 5.83% of the geographical area of India (Government of Karnataka 2023). Karnataka is located in southwestern India along the coastline, bordered by Maharashtra to the north, Goa to the northwest, and Kerala to the south. Karnataka can be divided into three distinct physiographic regions, viz., 'Karavali' or 'Canara' (coastal region), the 'Malnad' (hilly region comprising of Western Ghats), and 'Maidan' (plain region comprising of Deccan plateau). Biligiri Rangaswamy (BR) Hills lie in Karnataka at the confluence of Eastern and Western Ghats (Ganeshiah and Shaanker 1998), having a major portion of the sanctuary lying principally in Western Ghats (Ramesh 1989). This area is part of Biligiri Rangaswamy Temple Wildlife Sanctuary (BRT WLS), formed to preserve the unique ecology of BR hills. BRT WLS derives its name from Biligiri, which means 'white hill', on top of which Lord Ranganatha's temple is situated.

In the BRT Wildlife Sanctuary, the mycobiota is particularly diverse due to the sanctuary's unique geographical position, which blends the climatic and biological influences of both the Eastern and Western Ghats. This strategic location provides a mosaic of habitats that support a wide range of fungal species. Microfungi form a very crucial component of forest ecosystems. They serve as decomposers, saprophytes, nutrient-recyclers, and symbiotic associates (mutualistic, parasitic, and commensalistic), thereby playing a vital role in the long-

term stability of ecosystems (Reverchon et al. 2010; Geml et al. 2014). Several works on microfungal biota from different parts of Karnataka are available, such as Raviraja (2005) reported 18 species of fungal endophytes from five medicinal plant species from Kudremukh Range Karnataka; Naik et al. (2008) reported 6,125 fungal endophytes from 15 medicinal plants of Malnad Region; Pande (2008) reported Ascomycetes of peninsular India; Bhat et al. (2009), Bhat (2010) and Pratibha et al. (2012) reported diversity of microfungi from the forests of Western Ghats; Lakshman et al. (2010) reported a higher percentage of root colonization by arbuscular mycorrhizal fungi in *Vigna mungo* than in *Vicia faba*, among the selected leguminous plants of Mercara in Karnataka; and Sreenivasa et al. (2010) reported fungi associated with sorghum grain harvested from Karnataka.

Taxonomic and ecological aspects of aquatic fungal diversity have been explored for Kali River in the Western Ghats Region of Karnataka in a series of publications, such as Sridhar and Sudheep (2011), and Sudheep and Sridhar (2012, 2013a, 2013b). Naveenkumar et al. (2011) compared fungal diversity in the agricultural and non-agricultural soils of Bhadravathi Taluka of Shimoga District; Banakar et al. (2012) studied diversity of soil fungi in dry deciduous forest of Bhadra Wild Life Sanctuary; Rajkumar et al. (2012) examined diversity of arbuscular mycorrhizal fungi associated with some medicinal plants in Western Ghats of Karnataka.

Uzma et al. (2016) isolated 112 endophytic fungi from six wild medicinal plants belonging to Bisle Region, Western Ghats of Karnataka, and studied ecological aspects

and extracellular enzyme activities of the isolated fungal endophytes. About 82 species belonging to 32 genera were identified from the soils of Mattavara forest, Chikamagalur, Karnataka by Chandini and Rajeshwari (2017). Recently, Sharma and Mishra (2019) reported a checklist of Fungi in Karnataka containing a total of about 1255 species under about 410 genera and 140 families, which included both microfungi as well as macrofungi. Nevertheless, a comprehensive investigation into the microfungi of the BRT Wildlife Sanctuary (WLS) has not been conducted so far. Therefore, considering the distinctive biogeographical attributes of the BRT Wildlife Sanctuary, the Botanical Survey of India embarked on an extensive study aimed to document the microfungal diversity of this protected area.

MATERIALS AND METHODS

Study area

Biligiri Rangaswamy Temple Wildlife Sanctuary (BRT WLS) is located between $11^{\circ}47'-12^{\circ}09'N$ and $77^{\circ}00'-77^{\circ}16'E$ in the Chamrajnagar District of South-eastern Karnataka, bordering Tamil Nadu Province, India. BR Hills consist of roughly four parallel hill ranges of 600-1800 masl, running north-south, which support heterogeneous mosaic of vegetations, such as moist deciduous forest (25%), dry deciduous forest (36.1%), scrub (28.2%), grassland (3.4%), evergreen forest (6.1%), semi-evergreen forest (0.4%), and shola (0.8%) (Ramesh 1989) There are five forest ranges of the sanctuary - Yelandur, K. Gudi,

Punjur, Bylore, Kollegal. Kattari Betta is the highest peak rising to over 1800 masl (Srinivasan and Prashanth 2005). The annual temperature and precipitation vary with elevation (Aravind et al. 2001; Jayanthi and Jalal 2023).

Field data collection

A total of five collection surveys were undertaken between 2014 and 2016, during which all the forest types were explored in all the major seasons. GPS coordinates of collection locations were also recorded. QGIS 3.14 'Pi' version was used for plotting GPS data to prepare a survey map showing collection sites visited during the field surveys (Figure 1). Glimpse of the study areas are presented in Figure 2.

Plant materials infested with fungi were collected during the exploration. The samples include live plants materials, foliicolous plant specimens, litter samples (bark litter, leaf litter, twig litter, branch litter, flower and fruit litter, etc.), dried decaying plant specimens, and rhizospheric soil. In these five field surveys, 322 live plant specimens, 791 dry litter samples (stem litter, twig litter, leaf litter, bark litter, etc.) and 14 rhizosphere soil samples were collected. The foliicolous specimens were collected in the aluminium foil packets to avoid infestation of saprophytes, labelled, and brought to the laboratory for further processing. Stem litter, bark litter, twig litter, leaf litter, fruit and flower litter etc. were collected for the study of litter fungi. The litter samples were collected in brown packets.

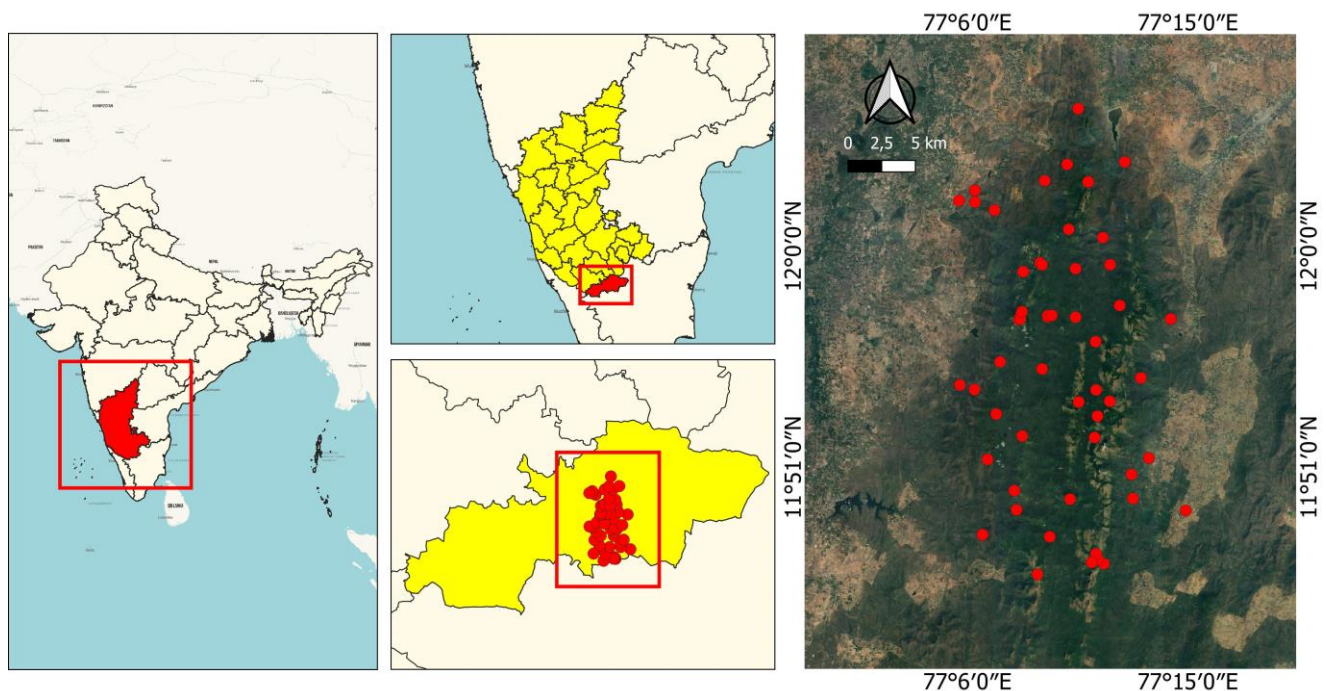


Figure 1. Map of the Biligiri Rangaswamy Temple Wildlife Sanctuary (BRT WLS), Karnataka, India, with collection points plotted on google maps and a map prepared using QGIS. Source: Karnataka Forest Department (for Contour Map)

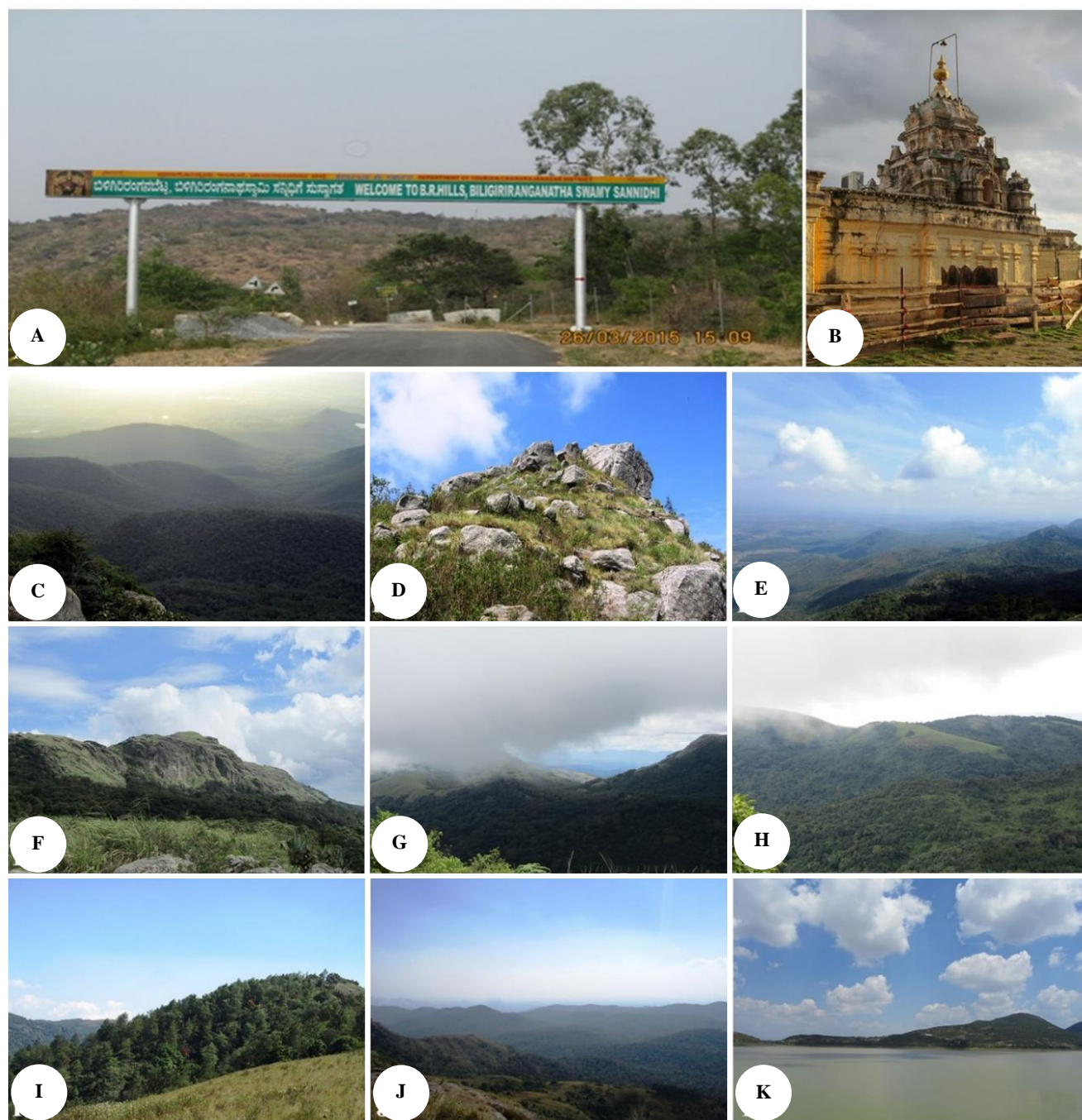


Figure 2. Overview of the Biligiri Rangaswamy Temple Wildlife Sanctuary (BRT WLS), India: A. Entry gate of BRT WLS, B. Biligirirangan Temple, C. BR Hills, D-E. Malkibetta, F. Jodigede, G. Bylore Range, H. Gudi Range, I. Gummanebetta, J. Yelandur Range, K. Gundal Dam

For soil fungi and Vesicular Arbuscular Mycorrhizal (VAM) fungi, rhizosphere soil samples were collected in brown packets. The roots of the plants adjacent to the rhizospheric soil were also collected and preserved in Formalin-Aceto-Alcohol (FAA). Collected samples were properly labelled. For foliicolous and litter fungi, hand sectioning, moist chamber incubation (Hawksworth 1974; Cannon and Sutton 2004), and three-step sterilization process methods were used. For leaf litter fungi, Particle Filtration Method (Bills and Polishook 1994) was used. For Soil fungi, Dilution Plating Method (Waksman 1922, 1927)

was used. For Vesicular Arbuscular Mycorrhizal (VAM) fungi, wet sieving and decanting techniques (Gerdemann and Nicolson 1963) were used, and staining procedure was used for arbuscular mycorrhizal root.

Fungal identification

The fungi were identified and described following several monographs, books and reviews from standard books, and journals. Ainsworth et al. (1973) and von Arx (1981) offer identification keys to majority of the fungal groups. Barron (1968) and Barnett and Hunter (1972) were

referred for lower fungal groups. Fungal species which form spores in Acervuli or Pycnidia were identified following Sutton (1980) and Raj (1993). Anamorphic Ascomycota were identified from Ellis (1971, 1976), Ellis and Ellis (1985), Seifert et al. (2011). Identification of Ascomycetes was based on Dennis (1978), Hanlin (1998) and Pande (2008). Identification of Bitunicate Ascomycetes was based on Sivanesan (1983). For identification of black mildew fungi, Hosagoudar (1996, 2008, 2012, 2013) were referred. Identification of numerous rust and smut species was done by Cummins and Hirsukta (1983). Gilman (1945), Nagamani et al. (2006), and Guarro et al. (2012) were referred for soil fungi. For the identification of VAM fungi were referred to Schenck and Pérez (1990) and Błaszowski (2012). The recent taxonomic position of fungal genera and species was recorded from online databases such as Index Fungorum (<http://www.indexfungorum.org>), Species Fungorum (www.speciesfungorum.org) and Mycobank (<http://www.mycobank.org>).

RESULTS AND DISCUSSION

Fungal diversity

A total of 164 species were identified from 290 fungal isolates. It includes 122 taxa from 207 litter fungal isolates, 43 taxa from 64 foliicolous fungal isolates, 7 taxa from 11 VAM fungal isolates, and 5 taxa from 8 soil fungal isolates (Figure 3. A). The total taxa do not sum up to 177, since 13 taxa were isolated from more than one type of substrate, viz., litter and foliicolous, hence were not double counted in arriving at the total. The 13 species are *Alternaria* sp., *Alternaria tenuissima*, *Cladosporium* sp., *Cladosporium oxysporum*, *Curvularia brachyspora*, *Dictyoarthrinium sacchari*, *Epicoccum nigrum*, *Neopestalotiopsis asiatica*, *Periconia* sp., *Sordaria fimicola*, *Stachybotrys levisporus*, *Temerariomyces acutulus*, and *Torula herbarum*. Microscopic and SEM images of some morphologically interesting fungi found in the study are given in Figures 4 and 5, respectively. The genera found to be dominant in having most species are *Curvularia* of 8 species, *Alternaria*

of 7 species, *Asterina* of 5 species, *Glomus* of 4 species, *Neopestalotiopsis* of 4 species, and *Periconia* of 4 species (Figure 3. B). The species found to be dominant (Figure 3. C) in accounting for most isolates are *S. fimicola* of 20 isolates, *Monodictys putredinis* of 19 isolates, *T. herbarum* of 11 isolates, *S. levisporus* of 6 isolates, *Alternaria alternata* of 5 isolates, *C. oxysporum* of 5 isolates, and *Rhinochlaidiella cristaspora* of 5 isolates.

The present study also resulted in the discovery of 5 new taxa including 1 new genus viz., *Biligiriella* S. Sengupta & Rashmi Dubey along with its type species *Biligiriella indica* S. Sengupta & Rashmi Dubey (Sengupta and Dubey 2021); and 3 another new species viz., *Colemaniella biligiriensis* Rashmi Dubey & S. Sengupta (Sengupta and Dubey 2016), *Elotespora indica* Rashmi Dubey & S.S. Chatterjee (Chatterjee and Dubey 2019), *Sporidesmium biligiriense* Rashmi Dubey & S. Sengupta (Dubey and Sengupta 2015).

Fungal checklist

A total of 290 fungal isolates were obtained from samples collected from the study area, belonging to 164 species. The following checklist shows location and substrate-wise enumeration of fungi along with collection details, in which SSC refers to collector, Shreya Sengupta Chatterjee; BSI (WRC) is in reference to herbarium of Botanical Survey of India, Western Regional Centre, Pune.

1. *Acanthostigma* sp. (Tubeufiaceae) on **stem litter** from Jodigede, 20/12/2016, SSC, BSI (WRC) 203327.
2. *Acaulospora longula* Spain & N.C. Schenck 1984 (Acaulosporaceae) on **rhizosphere soil** from Bylore, 01/10/2014, SSC, BSI (WRC) 203397.
3. *Acaulospora* sp. (Acaulosporaceae) on **rhizosphere soil** from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 203397; and from Manjigede, 02/10/2014, SSC, BSI (WRC) 203396.
4. *Acrodictys sacchari* M.B. Ellis 1971 (Acrodictyceae) on **stem litter** from Bylore, 05/09/2015, SSC, BSI (WRC) 202283.
5. *Acrostalagmus luteoalbus* (Link) Zare, W. Gams & Schroers 2004 (Hypocreaceae) on **stem litter** from Arre Pallya, 14/12/2016, SSC, BSI (WRC) 202292.

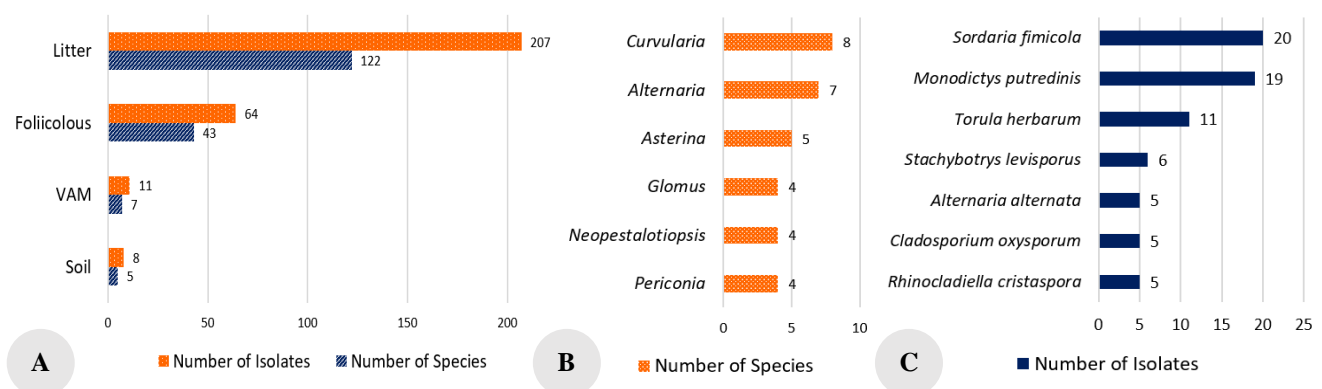


Figure 3. Fungal obtained and identified in the research sites: A. Total number of fungal isolates and species as per the substrates, B. Dominant genera in terms of species, and C. Dominant species in terms of isolates

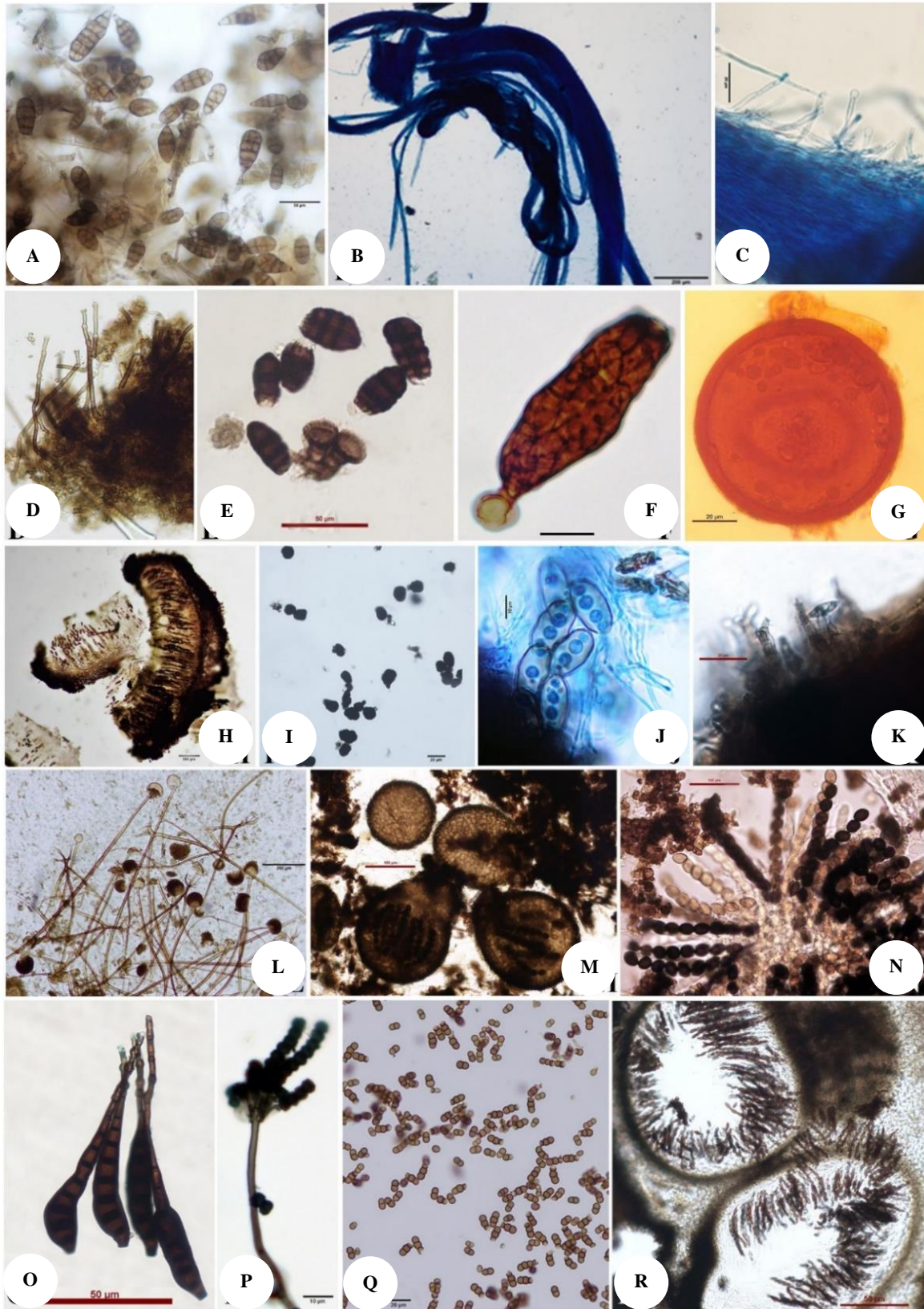


Figure 4. Microfungi of BRT WLS, India: A. *Alternaria alternata*, B-C. *Biligiella indica*, D. *Cladosporium oxysporum*, E. *Colemaniella biligiensis*, F. *Elotespora indica*, G. *Glomus macrocarpum*, H. *Hysterium tamarindi*, I. *Monodictys putredinis*, J. *Physalospora alpestris*, K. *Rhinocladia cristaspora*, L. *Rhizopus stolonifera*, M-N. *Sordaria fimicola*, O. *Sporidesmium biligiense*, P. *Stachybotrys levisporus*, Q. *Torula herbarum*, R. *Xylaria polymorpha*. (Scale bars: A, D, E, R = 50 μ m; B, L = 200 μ m; C, G, I, K, O, Q = 20 μ m; F, J, P = 10 μ m; H, M, N = 100 μ m)

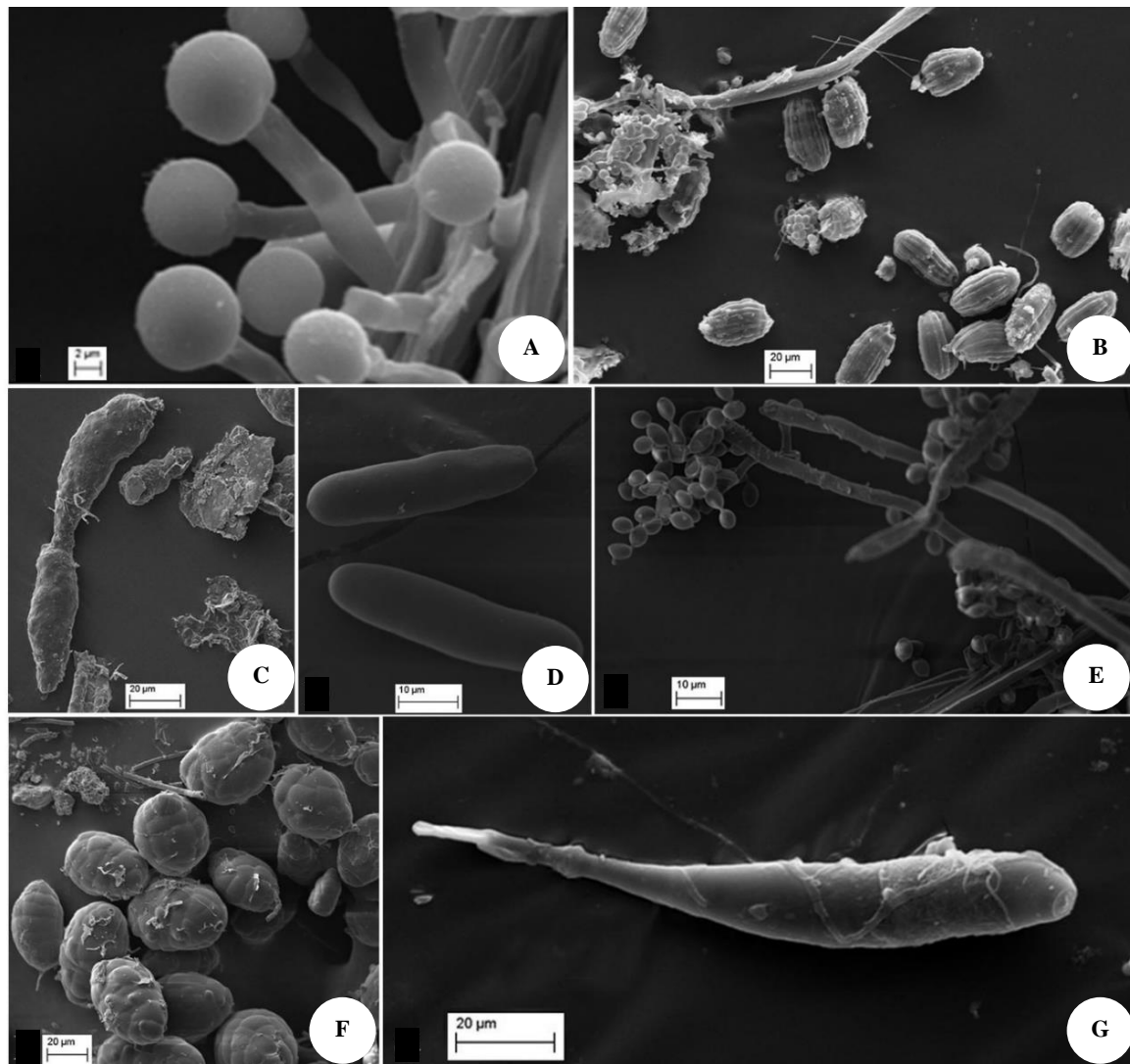


Figure 5. SEM Images of some interesting microfungi of BRT WLS, India: A. *Biligiriella indica*, B. *Colemaniella biligiriensis*, C. *Elotespora indica*, D. *Kirschsteiniothelia atra*, E. *Phaeoblastophora peckii*, F. *Rhexoacrodictys erecta*, G. *Sporidesmium biligiriense*. (Scale bars A = 2 µm; B, C, F, G = 20 µm; D, E = 10 µm)

6. *Alternaria alternata* (Fr.) Keissl. 1912 (Pleosporaceae) on **leaves** of unidentified host from Attikan coffee estate, 03/06/2014, SSC, BSI (WRC) 197564; from Bylore, 01/10/2014, SSC, BSI (WRC) 202121; from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 202295; *Coffea arabica* L. from Manjigede, 02/10/2014, SSC, BSI (WRC) 202139; and *Cordia* sp. from Punajur, 30/05/2014, SSC, BSI (WRC) 197529.
7. *Alternaria botrytis* (Preuss) Woudenb. & Crous 2013 (Pleosporaceae) on **bark litter** from Boreduddi, 02/10/2014, SSC, BSI (WRC) 197585.
8. *Alternaria chlamydospora* Mouch. 1973 (Pleosporaceae) on *Cymbopogon* sp. from Jodigede, 03/06/2014, SSC, BSI (WRC) 197575.
9. *Alternaria dianthicola* Neerg. 1945 (Pleosporaceae) on **leaves** of *Kigelia africana* (Lam.) Benth. from Bedguli, 30/05/2014, SSC, BSI (WRC) 197537.
10. *Alternaria sonchi* Davis 1916 (Pleosporaceae) on **stem litter** from Attikan coffee estate, 03/06/2014, SSC, BSI (WRC) 197570.
11. *Alternaria* sp. (Pleosporaceae) on **leaves** of *Ficus* sp. from Attikan coffee estate, 03/06/2014, SSC, BSI (WRC) 197566; *Cinnamomum* sp. from Attikan coffee estate, 03/06/2014, SSC, BSI (WRC) 197568; unidentified host from Bedguli, 30/05/2014, SSC, BSI (WRC) 197537; unidentified host from Neilekadiru, 29/05/2014, SSC, BSI (WRC) 197518; and **fallen leaves** from Burude, 15/12/2016, SSC, BSI (WRC) 203320.
12. *Alternaria tenuissima* (Kunze) Wiltshire 1933 (Pleosporaceae) on **leaves** of unidentified host from Neilekadiru, 29/05/2014, SSC, BSI (WRC) 197519; and **stem litter** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203350.

13. *Alysidium resinae* (Fr.) M.B. Ellis 1971 (Botrybasidiaceae) on **stem litter** from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203329.
14. *Apiospora arundinis* (Corda) Pintos & P. Alvarado 2021 (Apiosporaceae) on **stem litter** from Gundal dam, 25/03/2015, SSC, BSI (WRC) 203302; from K. Gudi, 08/09/2015, SSC, BSI (WRC) 202264; from K. Gudi, 14/12/2016, SSC, BSI (WRC) 202291; and from Malkibetta, 15/12/2016, SSC, BSI (WRC) 202299.
15. *Aspergillus fumigatus* Fresen. 1863 (Aspergillaceae) on **soil** from Bodipadaga, 08/09/2015, SSC, BSI (WRC) 203386.
16. *Aspergillus nidulans* (Eidam) G. Winter 1884 (Aspergillaceae) on **soil** from Bedguli, 29/03/2015, SSC, BSI (WRC) 203391; from Hoonahmatti, 28/03/2015, SSC, BSI (WRC) 203389; and from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203392.
17. *Aspergillus niger* Tiegh. 1867 (Aspergillaceae) on **soil** from C-matti, 06/09/2015, SSC, BSI (WRC) 203388; and from K. Gudi, 16/12/2016, SSC, BSI (WRC) 203387.
18. *Asterina jambolanae* A.K. Kar & Maity 1970 (Asterinaceae) on **fallen leaves** of *Ficus* sp. from Dodda Sampigge, 02/04/2015, SSC, BSI (WRC) 203333.
19. *Asterina plectranthi* Hosag., Manojk. & H. Biju 2005 (Asterinaceae) on **fallen leaves** from C-matti, 02/04/2015, SSC, BSI (WRC) 203334.
20. *Asterostomella lepianthis* Hosag., M.P. Balakr. & Goos 1996 (Asterinaceae) on **fallen leaves** from Bedguli, 29/03/2015, SSC, BSI (WRC) 203335.
21. *Asterostomella* sp. (Asterinaceae) on **fallen leaves** from Dodda Sampigge, 02/04/2015, SSC, BSI (WRC) 203336.
22. *Asterina averrhoae* Hosag., Kamar. & K.P. Babu 2002 (Asterinaceae) on **fallen leaves** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203314.
23. *Asterina cynanchi* Hosag. & Shiburaj 2002 (Asterinaceae) on **fallen leaves** from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 203313.
24. *Asterina plectranthi* Hosag., Manojk. & H. Biju 2005 (Asterinaceae) on **fallen leaves** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203317.
25. *Bambusaria bambusae* (J.N. Kapoor & H.S. Gill) Jaklitsch, D.Q. Dai, K.D. Hyde & Voglmayr 2015 (Valsariaceae) on **fallen stem** from Attikan coffee estate, 21/12/2016, SSC, BSI (WRC) 203337.
26. *Beltrania mangiferae* Munjal & J.N. Kapoor 1963 (Beltraniaceae) on **fallen leaves** from Bedguli, 30/05/2014, SSC, BSI (WRC) 197586; and from Jodigede, 09/09/2015, SSC, BSI (WRC) 202278.
27. *Beltraniella spiralis* Piroz. & S.D. Patil 1966 (Amphisphaeriaceae) on **stem litter** from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202203.
28. *Bhadradriella hyalina* Nagaraju, Kunwar & Manohar. 2011 (Pezizomycotina) on **leaves** of *Cocos nucifera* L. from Yelandur, 06/09/2015, SSC, BSI (WRC) 202259.
29. *Biligiriella indica* S. Sengupta & Rashmi Dubey 2021 (Pezizomycotina) on **stem litter** from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202199.
30. *Bipolaris papendorffii* (Aa) Alcorn 1983 (Pleosporaceae) on **leaves** of *Casearia* sp. from Hoonahmatti, 31/05/2014, SSC, BSI (WRC) 197541.
31. *Bispora antennata* (Pers.) E.W. Mason 1953 (Pezizomycotina) on **leaves** of *Chromolaena odorata* (L.) King & H.E. Robins from Burude, 28/05/2014, SSC, BSI (WRC) 197508.
32. *Bitunicostilbe clavata* (Ellis & G. Martin) M. Morelet 1971 (Pezizomycotina) on **fallen leaves** from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203348.
33. *Chaetomium globosum* Kunze 1817 (Chaetomiaceae) on **fallen leaves** from Hoonahmatti, 28/03/2015, SSC, BSI (WRC) 203389.
34. *Chaetosphaerulina lignicola* (Sivan., Panwar & S.J. Kaur) J.L. Crane, Shearer & M.E. Barr 1998 (Tubeufiaceae) on **stem litter** from K. Gudi, 02/10/2014, SSC, BSI (WRC) 197600.
35. *Chaetosphaerulina* sp. (Tubeufiaceae) on **stem litter** from Gundal dam, 25/03/2015, SSC, BSI (WRC) 202268.
36. *Chrysosporium* sp. (Onygenaceae) on **fallen twig** from Basunebetta, 21/12/2016, SSC, BSI (WRC) 203303.
37. *Ciliochorella mangiferae* Syd. 1935 (Pestalotiopsidaceae) on **fallen leaves** of *Mangifera indica* L. from Attikan coffee estate, 21/12/2016, SSC, BSI (WRC) 203304; and from K. Gudi, 14/12/2016, SSC, BSI (WRC) 202294.
38. *Cladosporium calotropidis* F. Stevens 1917 (Cladosporiaceae) on **leaves** of unidentified host from K. Gudi, 16/12/2016, SSC, BSI (WRC) 203338.
39. *Cladosporium oxysporum* Berk. & M.A. Curtis 1869 (Cladosporiaceae) on **leaves** of unidentified host from K. Gudi, 03/10/2014, SSC, BSI (WRC) 202157; **fallen bark** of unidentified plant from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197588; **fallen stem** from K. Gudi, 03/10/2014, SSC, BSI (WRC) 202154; from K. Gudi game road, 08/09/2015, SSC, BSI (WRC) 202202; and from Malkibetta, 15/12/2016, SSC, BSI (WRC) 202299.
40. *Cladosporium* sp. (Cladosporiaceae) on **leaves** of *Ficus* sp. from Attikan coffee estate, 03/06/2014, SSC, BSI (WRC) 197566; *Heliocarpus* sp. from Burude, 28/05/2014, SSC, BSI (WRC) 197514; **fallen leaves** from Atree GH, 02/10/2014, SSC, BSI (WRC) 197587; **stem litter** from MPCA, 06/09/2015, SSC, BSI (WRC) 203339; from BR hills, 27/03/2015, SSC, BSI (WRC) 202187; from C-matti, 02/10/2014, SSC, BSI (WRC) 202193; from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 202295; from K. Gudi, 15/12/2016, SSC, BSI (WRC) 203340; and from Manjigede, 02/10/2014, SSC, BSI (WRC) 202146.
41. *Cladotrichum mitratum* Penz. & Sacc. 1902 (Chaetosphaerellaceae) on **dried leaves** of *Bambusa bambos* (L.) Voss from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202261.
42. *Claussenomyces prasinulus* (P. Karst.) Korf & Abawi 1971 (Tympanidaceae) on **stem litter** from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 202289.

43. *Colemaniella biligiriensis* Rashmi Dubey & S. Sengupta 2016 (Pezizomycotina) on **dried leaves** of *Terminalia bellirica* (Gaertn.) Roxb. from Jodigede, 26/03/2015, SSC, BSI (WRC) 202200 [holotype]; and **fallen leaves** from Bodipadaga, 26/03/2015, SSC, BSI (WRC) 203341.
44. *Colletotrichum coffeanum* F. Noack 1901 (Glomerellaceae) on **leaves** of *C. arabica* L. from Manjigede, 02/10/2014, SSC, BSI (WRC) 202139.
45. *Cordana pauciseptata* Preuss 1851 (Cordanaceae) on **fallen stem** from K. Gudi, 16/12/2016, SSC, BSI (WRC) 203342; and from MPCA, 30/03/2015, SSC, BSI (WRC) 203321.
46. *Corynespora masseeanum* (Teng) P.M. Kirk 2014 (Corynesporascaceae) on **fallen stem** from Attikan coffee estate, 10/09/2015, SSC, BSI (WRC) 202204; from Boreduddi, 02/10/2014, SSC, BSI (WRC) 203343; from K. Gudi, 15/12/2016, SSC, BSI (WRC) 202298; and from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203309.
47. *Corynespora* sp. (Corynesporascaceae) on **fallen twig** from C-matti, 02/04/2015, SSC, BSI (WRC) 203344.
48. *Curvularia australiensis* (Bugnic. ex M.B. Ellis) Manamgoda, L. Cai & K.D. Hyde 2012 (Pleosporaceae) on **leaves** of *K. africana* (Lam.) Benth. from Bedguli, 30/05/2014, SSC, BSI (WRC) 197537.
49. *Curvularia brachyspora* Boedijn 1933 (Pleosporaceae) on **leaves** of *Mimosa pudica* L. from K. Gudi, 02/06/2014, SSC, BSI (WRC) 197561; unidentified host from Neilekadiru, 29/05/2014, SSC, BSI (WRC) 197520; **fallen leaves** from Gumbe gallu, 18/12/2016, SSC, BSI (WRC) 203390.
50. *Curvularia eragrostidis* (Henn.) J.A. Mey. 1959 (Pleosporaceae) on **leaves** of *Tarena asiatica* (L.) Kuntze ex K.Schum. from Bylore, 01/06/2014, SSC, BSI (WRC) 197554.
51. *Curvularia lunata* (Wakker) Boedijn 1933 (Pleosporaceae) on **leaves** of unidentified host from Bylore, 01/10/2014, SSC, BSI (WRC) 202135.
52. *Curvularia pallescens* Boedijn 1933 (Pleosporaceae) on **leaves** of *Myristica fragrans* Houtt. from Hoonahmatti, 31/05/2014, SSC, BSI (WRC) 197538; and unidentified host from Hoonahmatti, 31/05/2014, SSC, BSI (WRC) 197548.
53. *Curvularia* sp. (Pleosporaceae) on **leaves** of *Casearia* sp. from Hoonahmatti, 31/05/2014, SSC, BSI (WRC) 197541.
54. *Curvularia spicifera* (Bainier) Boedijn 1933 (Pleosporaceae) on **leaves** of unidentified host from Neilekadiru, 29/05/2014, SSC, BSI (WRC) 197520.
55. *Curvularia trifolii* (Kauffman) Boedijn 1933 (Pleosporaceae) on **leaves** of *Curculigo* sp. from K. Gudi, 02/06/2014, SSC, BSI (WRC) 197560.
56. *Deightoniella* sp. (Magnaporthaceae) on **branch litter** from Bylore, 14/09/2015, SSC, BSI (WRC) 202260.
57. *Dendryphon vinosum* (Berk. & M.A. Curtis) S. Hughes 1958 (Torulaceae) on **stem litter** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203326.
58. *Deshpandiella jambolana* (T.S. Ramakr., Sriniv. & Sundaram) Kamat & Ullasa 1973 (Phyllachoraceae) on **branch litter** from K. Gudi, 02/10/2014, SSC, BSI (WRC) 202271.
59. *Diatrype* sp. (Diatrypaceae) on **dead stem** of *B. bambos* (L.) Voss from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202261.
60. *Dichotomopilus subfunicola* (X.Weii Wang & L. Cai) X.Weii Wang & Samson 2016 (Chaetomiaceae) on **stem litter** from Burude, 28/05/2014, SSC, BSI (WRC) 202198.
61. *Dictyoarthrinium sacchari* (J.A. Stev.) Damon 1953 (Didymosphaeriaceae) on **leaves** of *Saccharum* sp. from Burude, 28/05/2014, SSC, BSI (WRC) 202196; **stem litter** from Bodipadaga, 26/03/2015, SSC, BSI (WRC) 202197; from Gummanebetta, 03/04/2015, SSC, BSI (WRC) 203322; and from Manjigede, 31/03/2015, SSC, BSI (WRC) 202282.
62. *Diplocladiella scalaroides* G. Arnaud ex M.B. Ellis 1976 (Pezizomycotina) on **leaves** of *Strobilanthes* sp. from C-matti, 06/09/2015, SSC, BSI (WRC) 202254.
63. *Drechslera* sp. (Pleosporaceae) on **leaves** of unidentified host from Hoonahmatti, 31/05/2014, SSC, BSI (WRC) 197547.
64. *Duplicaria empetri* (Pers.) Fuckel 1870 (Rhytismataceae) on **stem litter** from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202279.
65. *Ellisemia bambusicola* (M.B. Ellis) J. Mena & G. Delgado 2000 (Sordariomycetes) on **stem litter** from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 202297; from Malkibetta, 04/10/2014, SSC, BSI (WRC) 202207; and **twig litter** from K. Gudi, 16/12/2016, SSC, BSI (WRC) 203342.
66. *Elotespora indica* Rashmi Dubey & S.S. Chatterjee 2019 (Pezizomycotina) on **twig litter** from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 203311.
67. *Endophragmiella theobromae* M.B. Ellis 1976 (Sordariomycetidae) on **stem litter** from K. Gudi, 26/03/2015, SSC, BSI (WRC) 203345.
68. *Epicoccum nigrum* Link 1816 (Didymellaceae) on **leaves** of *Ficus* sp. from Attikan coffee estate, 03/06/2014, SSC, BSI (WRC) 197566; and **stem litter** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203350.
69. *Epicoccum* sp. (Didymellaceae) on **leaves** of *K. africana* (Lam.) Benth. from Bedguli, 30/05/2014, SSC, BSI (WRC) 197537; and *B. bambos* (L.) Voss, from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202261.
70. *Exosporium gymnemae* P.N. Singh & S.K. Singh 2015 (Pezizomycotina) on **stem litter** from Burude, 28/05/2014, SSC, BSI (WRC) 202198.
71. *Exosporium monanthotaxis* Piroz. 1972 (Pezizomycotina) on **branch litter** from Malkibetta, 01/04/2015, SSC, BSI (WRC) 197589.
72. *Exserohilum turcicum* (Pass.) K.J. Leonard & Suggs 1974 (Pleosporaceae) on **stem litter** from Bedguli, 30/05/2014, SSC, BSI (WRC) 203384.
73. *Funneliformis dimorphicus* (Boyetchko & J.P. Tewari) Oehl, G.A. Silva & Sieverd. 2011 (Glomeraceae) on **rhizosphere soil** from Malkibetta, 15/12/2016, SSC, BSI (WRC) 203399; and from Neerdurgi, 17/12/2016, SSC, BSI (WRC) 203395.

74. *Fusarium* sp. (Nectriaceae) on unidentified host from Bylore, 01/10/2014, SSC, BSI (WRC) 202121.
75. *Fusarium udum* E.J. Butler 1910 (Nectriaceae) on **leaves** of unidentified host from K. Gudi, 30/09/2014, SSC, BSI (WRC) 202114.
76. *Fusicladium britannicum* (M.B. Ellis) U. Braun & K. Schub. 2008 (Venturiaceae) on leaves of *Anogeissus* sp. from Burude, 28/05/2014, SSC, BSI (WRC) 197511.
77. *Glomus macrocarpum* Tul. & C. Tul. 1845 (Glomeraceae) on **rhizosphere soil** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203398.
78. *Glomus macrocarpum* var. *macrocarpum* Tul. & C. Tul. 1845 (Glomeraceae) on **rhizosphere soil** from Bylore, 01/10/2014, SSC, BSI (WRC) 203400.
79. *Glomus microcarpum* Tul. & C. Tul. 1845 (Glomeraceae) on **rhizosphere soil** from Malkibetta, 15/12/2016, SSC, BSI (WRC) 203399.
80. *Glomus* sp. (Glomeraceae) on **rhizosphere soil** from Atree GH, 01/06/2014, SSC, BSI (WRC) 203394; from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 203396; and from Manjigede, 02/10/2014, SSC, BSI (WRC) 203396.
81. *Glonium keralense* A. Pande 2008 (Gloniaceae) on **twig litter** from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203329.
82. *Gonytrichum macrocladum* (Sacc.) S. Hughes 1952 (Chaetosphaeriaceae) on **stem litter** from Gundal dam, 25/03/2015, SSC, BSI (WRC) 202265.
83. *Helhonia rhamnigena* (Fautrey) B. Sutton 1980 (Pezizomycotina) on **fallen leaves** from Burude, 15/12/2016, SSC, BSI (WRC) 203320.
84. *Heteroconium citharexlyi* Petr. 1949 (Antennulariellaceae) on **stem litter** from K. Gudi, 16/12/2016, SSC, BSI (WRC) 202296.
85. *Hysterium tamarindi* Tilak & R. Rao 1966 (Hysteriaceae) on **stem litter** from K. Gudi, 26/03/2015, SSC, BSI (WRC) 203345.
86. *Idriella lunata* P.E. Nelson & S. Wilh. 1956 (Microdochiaceae) on **stem litter** from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 202289.
87. *Kamalomycetes mahabaleshwarensis* Rashmi Dubey & Moonamb. 2013 (Dothideomycetes) on **dead fallen wood** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197599.
88. *Kirschsteiniothelia atra* (Corda) D. Hawksw. 2014 (Kirschsteiniotheliaceae) on **stem litter** from Malkibetta, 15/12/2016, SSC, BSI (WRC) 203312.
89. *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl. 1909 (Botryosphaeriaceae) on **stem litter** from Boreduddi, 02/10/2014, SSC, BSI (WRC) 203343; from Manjigede, 31/03/2015, SSC, BSI (WRC) 202277; and from Neilekaduru, 27/03/2015, SSC, BSI (WRC) 203346.
90. *Leptopeltis gregaria* (Petr.) L. Holm & K. Holm 1977 (Leptopeltidaceae) on **stem litter** from Burude, 28/05/2014, SSC, BSI (WRC) 202267.
91. *Massarina albocarnis* (Ellis & Everh.) M.E. Barr 1992 (Massarinaceae) on **stem litter** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203325.
92. *Melanographium citri* (Gonz. Frag. & Cif.) M.B. Ellis 1963 (Pezizomycotina) on **stem litter** from Burude, 15/12/2016, SSC, BSI (WRC) 203310; and from Madigudi, 05/09/2015, SSC, BSI (WRC) 202287.
93. *Meliola buteae* Hafiz Khan, Azmatullah & Kafi 1955 (Meliolaceae) on **fallen leaves** from Malkibetta, 15/12/2016, SSC, BSI (WRC) 203347.
94. *Meliola mitragynae* Syd. & P. Syd. 1913 (Meliolaceae) on **fallen leaves** from Bedguli, 01/04/2015, SSC, BSI (WRC) 203348.
95. *Monodictys putredinis* (Wallr.) S. Hughes 1958 (Pezizomycotina) on **stem litter** from Boreduddi, 02/10/2014, SSC, BSI (WRC) 197581; from Gundal dam, 25/03/2015, SSC, BSI (WRC) 202274; from Basunebetta, 21/12/2016, SSC, BSI (WRC) 203305; from Burude, 20/12/2016, SSC, BSI (WRC) 203354; from Dupabare, 20/12/2016, SSC, BSI (WRC) 203306; from Gundal dam, 25/03/2015, SSC, BSI (WRC) 202274; from Gundal dam, 22/12/2016, SSC, BSI (WRC) 203357; from Manjigede, 31/03/2015, SSC, BSI (WRC) 202275; from Gummanebetta, 26/03/2015, SSC, BSI (WRC) 197700; from BR hills, 16/12/2016, SSC, BSI (WRC) 203355; from K. Gudi, 15/12/2016, SSC, BSI (WRC) 203312; from K. Gudi, 15/12/2016, SSC, BSI (WRC) 203318; **twig litter** from Arre pallya, 14/12/2016, SSC, BSI (WRC) 202293; from Burude, 17/12/2016, SSC, BSI (WRC) 203353; from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203329; from Hoonahmatti, 28/03/2015, SSC, BSI (WRC) 203356; **bark litter** from Boreduddi, 02/10/2014, SSC, BSI (WRC) 197583; from Madigudi, 30/09/2014, SSC, BSI (WRC) 197579; **branch litter** from Kumaramathi, 06/09/2015, SSC, BSI (WRC) 202253.
96. *Moorella speciosa* P.Rag. Rao & D. Rao 1964 (Pezizomycotina) on **twig litter** from Gundal dam, 25/03/2015, SSC, BSI (WRC) 202268; **stem litter** from Manjigede, 02/10/2014, SSC, BSI (WRC) 202190; and from K. Gudi, 02/10/2014, SSC, BSI (WRC) 197600.
97. *Mucor mucedo* Fresen. 1850 (Mucoraceae) on **soil** from C-matti, 06/09/2015, SSC, BSI (WRC) 203388.
98. *Mycosphaerella deightonii* M. Morelet 1973 (Mycosphaerellaceae) on **leaves** of *C. odorata* (L.) King & H.E. Robins from Burude, 28/05/2014, SSC, BSI (WRC) 197504.
99. *Neoarthrinium urticae* (M.B. Ellis) Ning Jiang 2022 (Apiosporaceae) on **branch litter** from Malkibetta, 04/10/2014, SSC, BSI (WRC) 202192.
100. *Neopestalotiopsis asiatica* (Maharachch. & K.D. Hyde) Maharachch., K.D. Hyde & Crous 2014 (Pestalotiopsisaceae) on **leaves** of unidentified host from K. Gudi, 30/09/2014, SSC, BSI (WRC) 202109; and **fallen leaves** from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202257.
101. *Neopestalotiopsis chrysea* (Maharachch. & K.D. Hyde) Maharachch., K.D. Hyde & Crous 2014 (Pestalotiopsisaceae) on **fallen leaves** from Gundal dam, 25/03/2015, SSC, BSI (WRC) 202266; and from K. Gudi, 16/12/2016, SSC, BSI (WRC) 203360.

102. *Neopestalotiopsis clavispora* (G.F. Atk.) Maharachch., K.D. Hyde & Crous 2014 (Pestalotiopsidaceae) on **fallen leaves** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197584.
103. *Neopestalotiopsis* sp. (Pestalotiopsidaceae) on **fallen leaves** from Neerdurgi, 17/12/2016, SSC, BSI (WRC) 203361.
104. *Niesslia* sp. (Niessliaceae) on **stem litter** from Attikan coffee estate, 11/09/2015, SSC, BSI (WRC) 202288.
105. *Nigrospora oryzae* (Berk. & Broome) Petch 1924 (Sordariomycetes) on **stem litter** from Malkibetta, 15/12/2016, SSC, BSI (WRC) 202299.
106. *Paradictyoarthrinium diffractum* Matsush. 1996 (Paradictyoarthrinaceae) on **stem litter** from Arre pallya, 14/12/2016, SSC, BSI (WRC) 203358; from Yelandur gate, 24/12/2016, SSC, BSI (WRC) 203359; and **branch litter** from Yelandur, 06/09/2015, SSC, BSI (WRC) 202255.
107. *Parapericonia* sp. (Ascomycota) on **stem litter** from Bylore, 05/09/2015, SSC, BSI (WRC) 202286.
108. *Periconia cambrensis* E.W. Mason & M.B. Ellis 1953 (Pleosporales) on **twig litter** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197595.
109. *Periconia digitata* (Cooke) Sacc. 1886 (Pleosporales) on **bark litter** from Boreduddi, 02/10/2014, SSC, BSI (WRC) 197585.
110. *Periconia kambakkamensis* Subram. 1955 (Pleosporales) on **stem litter** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197593.
111. *Periconia* sp. (Pleosporales) on **leaves** of *B. bambos* (L.) Voss from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202261; and **stem litter** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197598.
112. *Phaeoblastophora peckii* (Sacc. & P. Syd.) Partr. & Morgan-Jones 2002 (Botryobasidiaceae) on **twig litter** from Kumaramathi, 17/12/2016, SSC, BSI (WRC) 203316.
113. *Phoma epicoccina* Punith., M.C. Tulloch & C.M. Leach 1972 (Didymellaceae) on **stem litter** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203350.
114. *Phoma herbarum* Westend. 1852 (Didymellaceae) on **fallen submerged leaves** from K. Gudi, 30/09/2014, SSC, BSI (WRC) 203351.
115. *Phoma* sp. (Didymellaceae) on **fallen submerged leaves** from Manjigede, 05/09/2015, SSC, BSI (WRC) 203362.
116. *Physalospora alpestris* Niessl 1876 (Hyponectriaceae) on **stem litter** from K. Gudi, 14/12/2016, SSC, BSI (WRC) 203324.
117. *Pithomyces ellisii* V.G. Rao & Chary 1972 (Astrosphaeriellaceae) on **twig litter** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 202191.
118. *Pithomyces sumiderensis* Hol.-Jech. 1986 (Astrosphaeriellaceae) on **stem litter** from K. Gudi, 02/10/2014, SSC, BSI (WRC) 197600.
119. *Podosporiella faureae* (Chupp & Doidge) M.B. Ellis 1976 (Pezizomycotina) on **branch litter** from Manjigede, 05/09/2015, SSC, BSI (WRC) 202290.
120. *Pseudocercospora glomerata* (Harkn.) U. Braun & Crous 2003 (Mycosphaerellaceae) on **fallen leaves** from Dodda alla, 17/12/2016, SSC, BSI (WRC) 203374.
121. *Pseudopithomyces maydicus* (Sacc.) Jun F. Li, Ariyaw. & K.D. Hyde 2015 (Didymosphaeriaceae) on **leaves** of unidentified host from Neilekaduru, 29/05/2014, SSC, BSI (WRC) 197524.
122. *Ramularia pusilla* Unger 1833 (Mycosphaerellaceae) on **fallen leaves** from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203307.
123. *Rhexoacrodictys erecta* (Ellis & Everh.) W.A. Baker & Morgan-Jones 2002 (Pleurotheciaceae) on **stem litter** from Gumbe gallu, 18/12/2016, SSC, BSI (WRC) 203323; and from Malkibetta road, 15/12/2016, SSC, BSI (WRC) 203319.
124. *Rhinochadiella cristaspora* Matsush. 1971 (Herpotrichiellaceae) on **unidentified host** from Burude, 28/05/2014, SSC, BSI (WRC) 197505; from Bylore, 01/10/2014, SSC, BSI (WRC) 202129; from K. Gudi, 30/09/2014, SSC, BSI (WRC) 202101; from K. Gudi, 03/10/2014, SSC, BSI (WRC) 202159; and from Punajur, 02/10/2014, SSC, BSI (WRC) 202149.
125. *Rhinochadiella selenoides* (de Hoog) Onofri & Castagn. 1983 (Herpotrichiellaceae) on **unidentified host** from K. Gudi, 15/12/2016, SSC, BSI (WRC) 203331.
126. *Rhizopus stolonifer* (Ehrenb.) Vuill. 1902 (Rhizopodaceae) on **soil** from Hoonahmatti, 31/05/2014, SSC, BSI (WRC) 197541.
127. *Rhodoveronaea varioseptata* Arzanlou, W. Gams & Crous 2007 (Sordariomycetidae) on **dead fallen stem** of *B. bambos* (L.) Voss from Hoonahmatti, 09/09/2015, SSC, BSI (WRC) 202261.
128. *Sadasivania* sp. (Pezizomycotina) on **dried submerged leaves of palm** from Gumbe gallu, 18/12/2016, SSC, BSI (WRC) 203364.
129. *Sarcinella indica* Kamal & Narayan 1987 (Englerulaceae) on **fallen submerged leaves** from K. Gudi, 30/09/2014, SSC, BSI (WRC) 203351.
130. *Sarcopodium circinatum* Ehrenb. 1818 (Pezizomycotina) on **stem litter** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 202189.
131. *Scytalidium lignicola* Pesante 1957 (Helotiales) on **leaf litter** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197590.
132. *Seimatosporium* sp. (Sporocadaceae) on **leaves** of *Cinnamomum* sp., from Attikan coffee estate, 03/06/2014, SSC, BSI (WRC) 197568; and unidentified host from K. Gudi, 30/09/2014, SSC, BSI (WRC) 202104.
133. *Solicorynespora foveolata* (Pat.) Shirouzu & Y. Harada 2008 (Pezizomycotina) on **branch litter** from C-matti, 02/04/2015, SSC, BSI (WRC) 203344.
134. *Sordaria fimicola* (Roberge ex Desm.) Ces. & De Not. 1863 (Sordariaceae) on **leaves** of *C. nucifera* L. from Burude, 13/09/2015, SSC, BSI (WRC) 202273; *M. indica* L. from Neilekaduru, 29/05/2014, SSC, BSI (WRC) 197522; **stem litter** from Dupabare, 15/12/2016, SSC, BSI (WRC) 203368; from Bodipadaga, 26/03/2015, SSC, BSI (WRC) 202269; from Dodda alla, 17/12/2016, SSC, BSI (WRC)

- 203367; from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197594; from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197597; from Gundal dam, 25/03/2015, SSC, BSI (WRC) 202276; from Hoonahmatti coffee estate, 09/09/2015, SSC, BSI (WRC) 202280; from Hoonahmatti, 28/03/2015, SSC, BSI (WRC) 203370; from Jodigede, 08/09/2015, SSC, BSI (WRC) 202188; from Jodigede, 18/12/2016, SSC, BSI (WRC) 203366; from K. Gudi, 14/12/2016, SSC, BSI (WRC) 202263; from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203301; from Malkibetta road, 15/12/2016, SSC, BSI (WRC) 203340; from Neerdurgi, 17/12/2016, SSC, BSI (WRC) 203369; **twig litter** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197592; from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197598; from Manjigede, 31/03/2015, SSC, BSI (WRC) 202282; and **branch litter** from Hoonahmatti, 18/12/2016, SSC, BSI (WRC) 203365.
135. *Spegazzinia sundara* Subram. 1956 (Apiosporaceae) on **stem litter** from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197591; and from Malkibetta, 15/12/2016, SSC, BSI (WRC) 202300.
136. *Spiropes intricatus* (Sacc.) M.B. Ellis 1968 (Pezizomycotina) on **stem litter** from Bylore, 05/09/2015, SSC, BSI (WRC) 197577.
137. *Sporidesmium biligiriense* Rashmi Dubey & S. Sengupta 2015 (Pleosporomycetidae) on **stem litter** from Manjigede, 02/10/2014, SSC, BSI (WRC) 197580.
138. *Sporidesmium cookei* (S. Hughes) M.B. Ellis 1958 (Pleosporomycetidae) on **stem litter** from Malkibetta, 15/12/2016, SSC, BSI (WRC) 203330.
139. *Sporidesmium vagum* Nees & T. Nees 1818 (Pleosporomycetidae) on **stem litter** from Gumbe gallu, 18/12/2016, SSC, BSI (WRC) 203323.
140. *Stachybotrys levisporus* (Subram.) Yong Wang bis, K.D. Hyde, McKenzie, Y.L. Jiang & D.W. Li 2015 (Stachybotryaceae) on **leaves** of *Strobilanthes* sp. from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197596; *Musa x paradisiaca* L. from Hoonahmatti, 06/09/2015, SSC, BSI (WRC) 202252; **twig litter** from Bedguli, 29/03/2015, SSC, BSI (WRC) 203349; **stem litter** from Burude, 28/05/2014, SSC, BSI (WRC) 202198; from Manjigede, 31/03/2015, SSC, BSI (WRC) 202282; and **bark litter** from Dodda Sampigge, 02/04/2015, SSC, BSI (WRC) 202275.
141. *Stachybotrys proliferatus* K.G. Karand., S.M. Kulk. & Patw. 1992 (Stachybotryaceae) on **leaves** of *Strobilanthes* sp., from Dodda Sampigge, 03/10/2014, SSC, BSI (WRC) 197596.
142. *Taeniolina scripta* (P. Karst.) P.M. Kirk 1981 (Pezizomycotina) on **stem litter** from Bedguli, 01/04/2015, SSC, BSI (WRC) 203371; and from Jodigede, 10/09/2015, SSC, BSI (WRC) 202262.
143. *Temerariomyces acutulus* B. Sutton 1993 (Pezizomycotina) on **leaves** of *Areca catechu* L. from Dodda Sampigge, 02/04/2015, SSC, BSI (WRC) 202270; and **fallen submerged leaves** from Malkibetta, 15/12/2016, SSC, BSI (WRC) 203372.
144. *Tetraploa aristata* Berk. & Broome 1850 (Tetraplosporaaceae) on **branch litter** from Bylore, 05/09/2015, SSC, BSI (WRC) 202258.
145. *Tharopama livistonae* Rashmi Dubey & Moonamb. 2013 (Pezizomycotina) on **leaves** of *C. nucifera* L., from Burude, 13/09/2015, SSC, BSI (WRC) 202273.
146. *Thyronectria sinopica* (Fr.) Jaklitsch & Voglmayr 2014 (Sordariomycetes) on **stem litter** from Hoonahmatti coffee estate, 09/09/2015, SSC, BSI (WRC) 202281.
147. *Torula herbarum* (Pers.) Link 1809 (Torulaceae) on **leaves** of *Saccharum* sp., from Burude, 28/05/2014, SSC, BSI (WRC) 202196; *C. nucifera* L., from Burude, 25/03/2015, SSC, BSI (WRC) 202195; **branch litter** from Boreduddi, 02/10/2014, SSC, BSI (WRC) 202272; from Burude, 28/05/2014, SSC, BSI (WRC) 202256; from Manjigede, 31/03/2015, SSC, BSI (WRC) 202277; **stem litter** from Burude, 28/05/2014, SSC, BSI (WRC) 202198; from Gundal dam, 25/03/2015, SSC, BSI (WRC) 197699; from K. Gudi, 30/09/2014, SSC, BSI (WRC) 197582; from K. Gudi, 26/03/2015, SSC, BSI (WRC) 197700; from Manjigede, 31/03/2015, SSC, BSI (WRC) 202282; from Neerdurgi, 17/12/2016, SSC, BSI (WRC) 203308.
148. *Trematosphaeria crassiseptata* Kaz. Tanaka, Y. Harada & M.E. Barr 2005 (Trematosphaeriaceae) on **stem litter** from Dodda Sampigge, 23/12/2016, SSC, BSI (WRC) 202285; from Dupabare foothills, 20/12/2016, SSC, BSI (WRC) 202297; and from Malkibetta, 04/10/2014, SSC, BSI (WRC) 202207.
149. *Trematosphaeria pertusa* Fuckel 1870 (Trematosphaeriaceae) on **stem litter** from Malkibetta road, 15/12/2016, SSC, BSI (WRC) 203352.
150. *Triadelphia heterospora* Shearer & J.L. Crane 1971 (Triadelphiaaceae) on **stem litter** from Bodipadaga, 08/09/2015, SSC, BSI (WRC) 202284.
151. *Trichocladium griseum* (Traaen) X. Wei Wang & Houbraken 2018 (Chaetomiaceae) on **fallen leaves** from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203392.
152. *Trichoderma viride* Pers. 1794 (Hypocreaceae) on **fallen leaves** from C-matti, 06/09/2015, SSC, BSI (WRC) 203393; and from Kataribetta, 21/12/2016, SSC, BSI (WRC) 203392.
153. *Trichothecium excentricum* Matsush. 1981 (Hypocreales) on **leaves** of unidentified host from K. Gudi, 03/10/2014, SSC, BSI (WRC) 202152.
154. *Trichothecium roseum* (Pers.) Link 1809 (Hypocreales) on **leaves** of unidentified host from Burude, 15/12/2016, SSC, BSI (WRC) 203340; from Bylore, 01/10/2014, SSC, BSI (WRC) 202125; and from Manjigede, 02/10/2014, SSC, BSI (WRC) 202141.
155. *Trimmatostroma saksenae* V.G. Rao & Varghese 1981 (Mollisiaceae) on **stem litter** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203315.
156. *Trimmatostroma scutellare* (Berk. & Broome) M.B. Ellis 1976 (Mollisiaceae) on **stem litter** from Jodigede, 01/04/2015, SSC, BSI (WRC) 202194; and from K. Gudi, 14/12/2016, SSC, BSI (WRC) 203377.

157. *Tripaspermum myrti* (Lind) S. Hughes 1951 (Capnodiaceae) on **stem litter** from Dodda Sampigge, 02/04/2015, SSC, BSI (WRC) 203333; and from Hoonahmatti, 28/03/2015, SSC, BSI (WRC) 203373.
158. *Urohendersonia indica* Syd. & P. Syd. 1916 (Pezizomycotina) on **fallen leaves** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203328.
159. *Uromyces* sp. (Pucciniaceae) on **fallen leaves** from K. Gudi game road, 06/09/2015, SSC, BSI (WRC) 203363.
160. *Virgariella globigera* (Sacc. & Ellis) S. Hughes 1953 (Pezizomycotina) on **stem litter** from K. Gudi, 14/12/2016, SSC, BSI (WRC) 203376.
161. *Volutina concentrica* Penz. & Sacc. 1902 (Nectriaceae) on **stem litter** from Hoonahmatti coffee estate, 09/09/2015, SSC, BSI (WRC) 202280.
162. *Xylaria polymorpha* (Pers.) Grev. 1824 (Xylariaceae) on **stem litter** from Bylore, 15/12/2016, SSC, BSI (WRC) 203378.
163. *Zygosporium masonii* S. Hughes 1951 (Zygosporiaceae) on **stem litter** from Bedguli, 18/12/2016, SSC, BSI (WRC) 203379.
164. *Zygosporium oscheoides* Mont. 1842 (Zygosporiaceae) on **stem litter** from Jodigede, 30/09/2014, SSC, BSI (WRC) 202161.

Discussion

The present study on the microfungi of BRT WLS is a landmark contribution to mycological research and forest ecology. By employing meticulous methodologies, including advanced microscopy, the research has significantly enhanced the understanding of fungal diversity and taxonomy in this unique biogeographical region of India.

The present study resulted in enumeration of 164 species from 290 fungal isolates. The isolated fungi belonged to 4 broad classes of substrates viz., Litter, Folii-colous, Arbuscular Mycorrhizal and Soil Fungi, among which Litter fungi dominated with 122 species identified from 207 isolates. *Curvularia* was most dominant species, having been represented by 8 species, while *S. fimicola* was most dominant species, having been identified from 20 isolates.

It also led to the publication of 5 new taxa which include 1 new genus with its type species and other 3 new species. Also, 75 genera and 129 species reported in the present study were not reported in the Checklist of Fungi of Karnataka by Sharma and Mishra (2019). The 129 species of microfungi are as follows: *Acanthostigma* sp., *A. longula*, *Acaulospora* sp., *A. sacchari*, *A. luteoalbus*, *A. botrytis*, *A. chlamydospora*, *A. dianthicola*, *A. sonchi*, *A. resinae*, *A. arundinis*, *A. jambolanae*, *A. plectranthi*, *A. lepianthi*, *Asterostomella* sp., *B. bambusae*, *B. mangiferae*, *B. spiralis*, *B. hyalina*, *B. indica*, *B. papendorfii*, *B. antennata*, *B. clavata*, *C. globosum*, *C. lignicola*, *Chrysosporium* sp., *C. mangiferae*, *C. oxysporum*, *C. mitratum*, *C. prasinulus*, *C. biligiriensis*, *C. pauciseptata*, *C. masseeanum*, *C. australiensis*, *C. pallescens*, *Deightoniella* sp., *D. vinosum*, *D. jambolana*, *D. subfunicola*, *D. sacchari*, *D. scalaroides*, *Drechslera* sp., *D. empetri*, *E. bambusicola*, *E. indica*, *E. theobromae*, *E.*

gymnema, *E. monanthotaxis*, *E. turcicum*, *F. dimorphicus*, *Fusarium* sp., *F. udum*, *F. britannicum*, *G. macrocarpum*, *G. macrocarpum* var. *macrocarpum*, *G. microcarpum*, *G. keralense*, *G. macrocladum*, *H. rhamnigena*, *H. citharexlyi*, *H. tamarindi*, *I. lunata*, *K. mahabaleshwarensis*, *K. atra*, *L. theobromae*, *L. gregaria*, *M. albocarnis*, *M. citri*, *M. putredinis*, *M. speciosa*, *M. mucedo*, *M. deightonii*, *N. urticae*, *N. asiatica*, *N. chrysea*, *N. clavispora*, *Neopestalotiopsis* sp., *Niesslia* sp., *N. oryzae*, *P. diffractum*, *Parapericonia* sp., *P. cambrensis*, *P. digitata*, *P. kambakkamensis*, *P. peckii*, *P. epicoccina*, *P. herbarum*, *P. alpestris*, *P. ellisii*, *P. sumiderensis*, *P. faureae*, *P. glomerata*, *P. maydicus*, *R. pusilla*, *R. erecta*, *R. cristaspora*, *R. selenoides*, *R. varioseptata*, *Sadasivania* sp., *S. indica*, *S. circinatum*, *S. lignicola*, *Seimatosporium* sp., *S. foveolata*, *S. fimicola*, *S. sundara*, *S. intricatus*, *S. biligiriense*, *S. cookei*, *S. vagum*, *S. levisporus*, *S. proliferatus*, *T. scripta*, *T. acutus*, *T. aristata*, *T. livistonae*, *T. sinopica*, *T. herbarum*, *T. crassiseptata*, *T. pertusa*, *T. heterospora*, *T. griseum*, *T. excentricum*, *T. saksenae*, *T. scutellare*, *U. indica*, *V. globigera*, *V. concentrica*, *Z. masonii*, *Z. oscheoides*.

The 75 genera are: *Acanthostigma*, *Acaulospora*, *Acrodactys*, *Acrostalagmus*, *Alysidium*, *Asterostomella*, *Bambusaria*, *Beltraniella*, *Bhadradiella*, *Biligiriella*, *Bispora*, *Bitunicostilbe*, *Chrysosporium*, *Ciliochorella*, *Cladotrichum*, *Claussenomyces*, *Colemaniella*, *Cordana*, *Deightoniella*, *Dendryphion*, *Deshpandiella*, *Dichotomopilus*, *Dictyoarthrinium*, *Diplocladiella*, *Drechslera*, *Duplicaria*, *Ellisemia*, *Elotespora*, *Endophragmiella*, *Exserohilum*, *Funneliformis*, *Fusicladium*, *Glonium*, *Gonytrichum*, *Helhonia*, *Heteroconium*, *Hysterium*, *Idriella*, *Kamalomyces*, *Kirschsteiniotelia*, *Lasiodiplodia*, *Leptopeltis*, *Massarina*, *Melanographium*, *Monodictys*, *Moorella*, *Neopestalotiopsis*, *Niesslia*, *Paradictyoarthrinium*, *Parapericonia*, *Phaeoblastophora*, *Podosporiella*, *Pseudopithomyces*, *Ramularia*, *Rhexoacrodictys*, *Rhinoclatiella*, *Rhodoveronaea*, *Sadasivania*, *Sarcopodium*, *Scytalidium*, *Seimatosporium*, *Solicorynespora*, *Sordaria*, *Spegazzinia*, *Sporidesmium*, *Taeniolina*, *Temerariomyces*, *Tetraploa*, *Tharopama*, *Thyronectria*, *Torula*, *Triadelphia*, *Trichocladium*, *Virgariella*, *Volutina*. Thus, the present study makes a significant contribution to the mycobiota of Karnataka. The findings underscore the critical ecological roles of microfungi and highlight the importance of conserving such rich and diverse ecosystems.

The BRT WLS, located in the southern Western Ghats of India is recognized for its rich biodiversity and unique ecological features. The thorough documentation of microfungi in this sanctuary not only highlights the ecological complexity of the area but also underscores its importance as a habitat for a diverse range of fungal species. This study has significantly expanded our understanding of the microfungi diversity within the BRT WLS by documenting a total of 75 genera and 129 species of microfungi. By identifying 75 genera and 129 species, the study provides a detailed inventory of the microfungi community in the BRT WLS. The genus *Curvularia*, with 8

recorded species, was the most dominant genus, followed by *Alternaria* 7 species, and *Asterina* 5 species. The *S. fimicola* was the most prevalent species, with 20 isolates, followed by *M. putredinis* with 19 isolates and *T. herbarum* with 11 isolates.

This represents a substantial contribution to the mycological knowledge of the region, showcasing the variety of microfungi that inhabit this specific ecological niche. The detailed inventory provided by this study serves as a foundational reference for future research. It opens up various avenues for further scientific inquiry, such as the exploration of the ecological roles of these fungi, their interactions with other organisms, and their responses to environmental changes. Additionally, it provides a baseline for monitoring changes in fungal diversity over time, which can be critical for assessing the impacts of climate change, habitat disturbance, and conservation efforts. This research adds valuable data to the global mycological database, contributing to a more complete understanding of fungal diversity in tropical and subtropical regions. By documenting species in a relatively understudied area, the study enriches our global knowledge of fungal biodiversity and distribution patterns. Overall, the study underscores the BRT WLS's significance as a critical area for both fungal biodiversity and conservation. It not only lays a robust foundation for future scientific research but also emphasizes the need for continued conservation efforts to protect and sustain the rich microfungi communities that contribute to the ecological health of this sanctuary.

ACKNOWLEDGEMENTS

The authors would like to express their deep thanks to Director, Botanical Survey of India and Head of Office, BSI, Western Regional Centre, Pune for providing research facilities. Ministry of Environment, Forest and Climate Change, New Delhi, is also thankfully acknowledged for financial support. All officials of Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary (WLS), Karnataka, India, are also thankfully acknowledged for providing the permission to conduct surveys in the WLS.

REFERENCES

- Ainsworth GC, Sparrow FK, Sussman AS. 1973. A Taxonomic Review with Keys: Ascomycetes and Fungi Imperfecti. IV A. Academic Press, New York.
- Aravind NA, Rao D, Madhusudan PS. 2001. Additions to the birds of Biligiri Rangaswamy Temple Wildlife Sanctuary, Western Ghats, India. *Zoos' Print J* 16 (7): 541-547. DOI: 10.11609/JoTT.ZPJ.16.7.541-7.
- Banakar SP, Thippeswamy B, Thirumalesh BV, Naveenkumar KJ. 2012. Diversity of soil fungi in dry deciduous forest of Bhadra Wildlife Sanctuary, Western Ghats of Southern India. *J For Res* 23 (4): 631-640. DOI: 10.1007/s11676-012-0304-y.
- Barnett HL, Hunter BB. 1972. Illustrated genera of Imperfect Fungi. Burgess Publishing Company, Minneapolis.
- Barron GL. 1968. The Genera of Hyphomycetes from Soil. Williams and Wilkins Co., Baltimore. DOI: 10.1097/00010694-196812000-00019.
- Bhat DJ, Pratibha J, Gawas P, Sarita KY, Swapnaja D. 2009. Diversity of microfungi in the forests of Western Ghats in Goa and surrounding regions. In: Krishnan S, Bhat DJ (eds.). Plant and Fungal Biodiversity and Bioprospecting. Broadway Book Centre, Panaji.
- Bhat DJ. 2010. Fascinating Microfungi (Hyphomycetes) of Western Ghats, India. Broadway Book Centre, Panaji.
- Bills GF, Polishook JD. 1994. Abundance and diversity of microfungi in leaf litter of a lowland rain forest in Costa Rica. *Mycologia* 86 (2): 187-198. DOI: 10.1080/00275514.1994.12026393.
- Błaszowski J. 2012. Glomeromycota: W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.
- Cannon PF, Sutton BC. 2004. Microfungi on wood and plant debris. In: Mueller GM, Bills GF, Foster MS (eds.). Biodiversity of Fungi: Inventory and Monitoring Methods. Elsevier Academic Press, Burlington. DOI: 10.1016/B978-012509551-8/50014-3.
- Chandini KC, Rajeshwari N. 2017. Isolation and identification of soil fungi in Mattavara forest, Chikamagalur, Karnataka. *J Pharmacogn Phytochem* 6 (5): 721-726.
- Chatterjee SS, Dubey R. 2019. *Elotespora indica*: A new and unusual species of Hyphomycetes from India. *Mycoscience* 60 (5): 271-273. DOI: 10.1016/j.myc.2018.11.002.
- Cummins GB, Hiratsuka Y. 1983. Illustrated Genera of Rust Fungi. Revised ed. American Phytopathological Society Press, St. Paul, Minnesota.
- Dennis RWG. 1978. British Ascomycetes. J. Cramer, Vaduz.
- Dubey R, Sengupta S. 2015. *Sporidesmium bilgiriense* - A new species of microfungi from Western Ghats of India. *Curr Res Environ Appl Mycol* 5 (4): 390-393. DOI: 10.5943/cream/5/4/10.
- Ellis MB, Ellis JP. 1985. Microfungi of land plants. An Identification Handbook. Croom Helm Ltd., London.
- Ellis MB. 1971. Dematiaceous Hyphomycetes. Commonwealth Mycological Institute: Kew, Surrey, England. DOI: 10.1079/9780851986180.0000.
- Ellis MB. 1976. More Dematiaceous Hyphomycetes. Commonwealth Mycological Institute, Kew. DOI: 10.1079/9780851983653.0000.
- Ganeshiah KN, Shaanker RU. 1998. Biligiri Rangaswamy Temple Wildlife Sanctuary: Natural history, Biodiversity and Conservation. ATREE and VGKK, Bangalore.
- Geml J, Pastor N, Fernandez L, Pacheco S, Semenova TA, Becerra AG, Wicaksono CY, Nohra ER. 2014. Large-scale fungal diversity assessment in the Andean Yungas forests reveals strong community turnover among forest types along an altitudinal gradient. *Mol Ecol* 23 (10): 2452-2472. DOI: 10.1111/mec.12765.
- Gerdemann JW, Nicolson TH. 1963. Spores of mycorrhizal *Endogone* species extracted from soil by wet sieving and decanting. *Trans Br Mycol Soc* 46 (2): 235-244. DOI: 10.1016/S0007-1536(63)80079-0.
- Gilman JC. 1945. A Manual of Soil Fungi. The Iowa State College Press, Ames.
- Government of Karnataka. 2023. Economic Survey of Karnataka 2023-24. Government of Karnataka, Bangalore.
- Guarro J, Gene J, Stchigel AM, Figueras MJ. 2012. Atlas of Soil Ascomycetes. CBS-KNAW Fungal Biodiversity Centre, Utrecht.
- Hanlin RT. 1998. Combined Keys to Illustrated Genera of Ascomycetes, vols. I & II. APS Press, Saint Paul, Minnesota.
- Hawksworth DL. 1974. Mycologist's Handbook. Commonwealth Mycological Institute, Kew. DOI: 10.1016/S0007-1528(74)80047-7.
- Hosagoudar VB. 1996. Meliolales of India. Botanical Survey of India, Kolkata.
- Hosagoudar VB. 2008. Meliolales of India, Vol. II. Botanical Survey of India, Kolkata.
- Hosagoudar VB. 2012. Asterinales of India. *Mycosphere* 2 (5): 617-852. DOI: 10.5943/mycosphere/3/5/9.
- Hosagoudar VB. 2013. Meliolales of India - Volume III. *J Threat Taxa* 5 (6): 39934068. DOI: 10.11609/JoTT.o3307.3993-4068.
- Jayanthi J, Jalal JS. 2023. A checklist to the orchids of biligiri rangaswamy temple tiger reserve, western Ghats, India. *Lankesteriana* 23 (1): 45-79. DOI: 10.15517/lank.v23i1.54573.
- Lakshman HC, Rohini Jambagi RJ, Pushpalatha KC, Murthy NK. 2010. Status of AM fungi on some important leguminous plants of Mercara in Karnataka. *Intl J Plant Prot* 3 (2): 382-386.
- Nagamani A, Manoharachary C, Kunwar IK. 2006. Handbook of Soil Fungi. IK International Publishing House, New Delhi.
- Naik BS, Shashikala J, Krishnamurthy YL. 2008. Diversity of fungal endophytes in shrubby medicinal plants of Malnad region, Western Ghats, Southern India. *Fungal Ecol* 1 (2-3): 89-93. DOI: 10.1016/j.funeco.2008.05.001.
- Naveenkumar KJ, Thirumalesh BV, Pradeepa K. 2011. Comparative study of Fungal Diversity in the Agricultural soil and Non-agricultural soil

- in Bhadravathi taluk, Shimoga District, Karnataka, India. *J Res Biol* 1 (2): 129-134.
- Pande A. 2008. *Ascomycetes of Peninsular India*. Scientific Publishers, Jodhpur, India.
- Pratibha J, Raghukumar S, Bhat DJ. 2012. Diversity of litter degrading microfungi from the forests of Western Ghats, India. In: Biju Kumar A, Nayar MP, Varma RV, Peethambaran CK (eds.). *Biodiversity and Taxonomy*. Narendra Publishing House, Delhi.
- Raj TRN. 1993. *Coelomycetous Anamorphs with Appendage-Bearing Conidia*. Mycologue Publications, Waterloo.
- Rajkumar HG, Seema HS, Kumar CPS. 2012. Diversity of arbuscular mycorrhizal fungi associated with some medicinal plants in Western Ghats of Karnataka region, India. *World J Sci Technol* 2 (1): 13-20.
- Ramesh BR. 1989. *Flora of Biligirirangan Hills*. [Ph.D. Thesis]. University of Madras, Chennai. [India]
- Raviraja NS. 2005. Fungal endophytes in five medicinal plant species from Kudremukh Range, Western Ghats of India. *J Basic Microbiol* 45 (3): 230-235. DOI: 10.1002/jobm.200410514.
- Reverchon F, María del Ortega-Larrocea P, Pérez-Moreno J. 2010. Saprophytic fungal communities change in diversity and species composition across a volcanic soil chronosequence at Sierra del Chichinautzin, Mexico. *Ann Microbiol* 60: 217-226. DOI 10.1007/s13213-010-0030-7.
- Schenck NC, Pérez Y. 1990. *Manual for the Identification of VA Mycorrhizal Fungi*. Synergistic Publications, Gainesville.
- Seifert K, Morgan-Jones G, Gams W, Kendrick B. 2011. The Genera of Hyphomycetes—2011 update. *Persoonia-Mol Phylogeny Evol Fungi* 27 (1): 119-129. DOI: 10.3767/003158511X617435.
- Sengupta S, Dubey R. 2016. *Colemaniella biligiriense* sp. nov. - A new Hyphomycetous fungus from Western Ghats of India. *Curr Res Environ Appl Mycol* 6 (3): 197-201. DOI: 10.5943/cream/6/3/7.
- Sengupta S, Dubey R. 2021. *Biligiriella indica* gen. et sp. nov.- a new hyaline Synnematosus fungus from hills of Biligiri Rangaswamy Temple Wildlife Sanctuary, Karnataka, India. *J Mycopathol Res* 59 (3): 319-321.
- Sharma JR, Karnataka Biodiversity Board, Gupta RK, Singh KP, Singh DK. 2019. *Fungi of Karnataka: A Checklist*. Flora of Karnataka, A Checklist. Volume - 1: Algae, Fungi, Lichens, Bryophytes & Pteridophytes. Karnataka Biodiversity Board, Bangalore.
- Sivanesan A. 1983. *The Bitunicate Ascomycetes and Their Anamorphs*. J. Cramer, Vaduz. DOI: 10.1016/S0007-1536(83)80084-9.
- Sreenivasa MY, Dass RS, Janardhana GR. 2010. Survey of postharvest fungi associated with sorghum grains produced in Karnataka (India). *J Plant Prot Res* 50 (3): 335-339. DOI: 10.2478/v10045-010-0057-6.
- Sridhar KR, Sudheep NM. 2011. The spatial distribution of fungi on decomposing woody litter in a freshwater stream, Western Ghats, India. *Microb Ecol* 61: 635-645. DOI: 10.1007/s00248-011-9803-1.
- Srinivasan U, Prashanth NS. 2005. Additions to the avifauna of the Biligirirangan Hills, Karnataka. *Indian Birds* 1 (5): 103-104.
- Sudheep NM, Sridhar KR. 2012. Aquatic hyphomycetes in hyporheic freshwater habitats of southwest India. *Limnologia* 42 (2): 87-94. DOI: 10.1016/j.limno.2012.02.001.
- Sudheep NM, Sridhar KR. 2013a. Colonization and diversity of aquatic hyphomycetes in relation to decomposition of submerged leaf litter in River Kali (Western Ghats, India). *Mycosphere* 4 (3): 456-476. DOI: 10.5943/mycosphere/4/3/3.
- Sudheep NM, Sridhar KR. 2013b. Fungal colonization and decomposition of submerged woody litter in River Kali of the Western Ghats, India. *Curr Res Environ Appl Mycol* 3 (1): 160-180. DOI: 10.5943/cream/3/1/3.
- Sutton BC. 1980. *The Coelomycetes, Fungi Imperfecti with Pycnidia, Acervuli and Stromata*. CAB International Mycological Research Institute, Kew.
- Uzma F, Konappa NM, Chowdappa S. 2016. Diversity and extracellular enzyme activities of fungal endophytes isolated from medicinal plants of Western Ghats, Karnataka. *Egypt J Basic Appl Sci* 3 (4): 335-342. DOI: 10.1016/j.ejbas.2016.08.007.
- von Arx JA. 1981. On *Monilia sitophila* and some families of Ascomycetes. *Sydowia* 34: 13-29.
- Waksman SA. 1922. The growth of fungi in the soil. *Soil Sci* 14 (2): 153-158. DOI: 10.1097/00010694-192208000-00007.
- Waksman SA. 1927. *Principles of Soil Microbiology*. Williams and Wilkins Co., Baltimore, Maryland. DOI: 10.5962/bhl.title.7930.