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Some rare and interesting fungal species of phylum Ascomycota from Western Ghats of Maharashtra: A taxonomic approach

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ABSTRACT

Two recent and important developments have greatly influenced and caused significant changes in the traditional concepts of systematics. These are the phylogenetic approaches and incorporation of molecular biological techniques, particularly the analysis of DNA nucleotide sequences, into modern systematics. This new concept has been found particularly appropriate for fungal groups in which no sexual reproduction has been observed (deuteromycetes). Taking this view during last five years surveys were conducted to explore the Ascomatal fungal diversity in natural forests of Western Ghats of Maharashtra. In the present study, various areas were visited in different forest ecosystems of Western Ghats and collected the live, dried, senescing and moribund leaves, logs, stems etc. This multipronged effort resulted in the collection of more than 1000 samples with identification of more than 300 species of fungi belonging to Phylum Ascomycota. The fungal genera and species were classified in accordance to Dictionary of fungi (10^{th} edition) and Index fungorum (http://www.indexfungorum.org).

Studies conducted revealed that fungal taxa belonging to phylum Ascomycota (316 species, 04 varieties in 177 genera) ruled the fungal communities and were represented by sub phylum Pezizomycotina (316 species and 04 varieties belonging to 177 genera) which were further classified into two categories: (1). Fungal taxa (66 sp. in 47 genera) classified upto Pezizomycotina (Anamorphic Pezizomycotina); (2) Fungal taxa (250 spp. &04 varieties in 130 genera) further classified in classes viz. Dothideomycetes - (140 spp. & 01 var. in 73 Genera), Eurotiomycetes (5 spp. in 4 Genera), Leotiomycetes - (17 spp. in 12 Genera), Sordariomycetes- (87 spp. & 03 var. in 40 Genera) and family Wiesneriomycetaceae (1sp. in 01 Genus)

Critical review reveals that majority of fungi belongs to class Dothideomycetes (140 spp & 01 variety in 73 genera,) which were further distributed among 28 fungal families. Fungal taxa (87 spp. & 03 varieties in 40 Genera) belonging to Sordariomycetes were further distributed among 17 fungal families. Fungal taxa (5 spp. in 4 genera) belonging to Class Eurotiomycetes was distributed among three families. Fungal taxa (17 spp. in 12 genera) belonging to Class Leotiomycetes were distributed among six families. The floristic research presented in this work included taxonomic position of interesting, rare and novel taxa of fungi belonging to Ascomycota with notes on their substrate affinity and habitats. The present study area forms the type locality two new genera, 11 new species. Inaddition to this some fungal taxawerenew additions to Fungi of India and many fungal taxa were found to be new to Western Ghats and besides this, many new host records were also reported during this period. Thus this research exploration presents an overview of interesting microfungi present in the Western Ghats of Maharashtra and also made here to unravel the cryptic microbial wealth of this region.

Key words: Ascomycota, Phylum, Taxonomy, Western Ghats.

INTRODUCTION

Fungal taxonomy is a dynamic, progressive discipline that consequently requires changes in nomenclature. Another difficulty in mycology is that fungi are mostly classified on the basis of their appearance rather than on the nutritional and biochemical differences. This implies that different concepts have to be applied in fungal taxonomy. With discovery of numerous novel fungi and greater insights drawn from the fungal kingdom by adapting newer methods such as gene sequencing and phylogeny analysis, species concept underwent major change in fungal taxonomy and systematics (Hyde et al. 2010). It seems evident that in the near future, modern molecular techniques will allow most of the pathogenic and opportunistic fungi to be connected to their corresponding sexual stages and integrated into a more natural taxonomic scheme. Ascomycetes are taxonomically difficult and over the last decade mycologists have concentrated on delimiting monophyletic orders rather grouping orders in higher taxa. The dual modality of fungal propagation, i.e., sexual and asexual, has meant that since the last century (Saccardo 1880). there has been a dual nomenclature. With the advent of molecular approaches in fungal taxonomy, some mycologists have advocated abandoning the dual system of naming because unified classification of all fungi may be possible on the basis of the rDNA sequences of the anamorphs (Blackwell 1993, Reynolds & Taylor 1991, Bruns et al. 1991). The aim of this paper is to update our present understanding of the systematics of opportunistic fungi, emphasizing their relationships with the currently accepted name of taxa of the phyla Ascomycota. Taking this view into consideration, during last five years surveys were conducted to explore the microfungal diversity in natural forests of Western Ghats of Maharashtra. The Northern Western Ghats represent diverse vegetation types and the forests in their climax conditions form a unique Biological Heritage. In the present study, various areas were visited in different forest ecosystems of Western Ghats and live, dried, senescing and moribund leaves, logs, stems etc were collected. This multipronged effort resulted in the collection of more than 1000 samples with identification of more than 300 species of fungi belonging to Phylum Ascomycota. This outcome in the collection of some interesting forms. The Fungi were identified down to species level based on conventional morphological parameters and were classified in accordance to Dictionary of fungi (10^{th} edition) & Index fungorum (http://www.indexfungorum.org).

MATERIAL AND METHODS

With a view to study the fungi associated with different substrates in their natural habitat and to give them detailed taxonomic treatment in the laboratory, a reconnaissance survey was carried out in the natural stands and forest plantations throughout the Western Ghats region of Maharashtra. The Western Ghats in Maharashtra passes into twelve districts viz. Dhule, Nasik, Thane, Nandurbar, Pune, Sindhudurg, Raigad, Satara, Ratnagiri, Sangli, Kolhapur, Ahmednagar. Survey aws conducted in almost all areas of Northern Western Ghats. Infected samples were brought to the laboratory in the aluminium foil bags so that saprophytes may not attack them. Further processing of infected samples was carried out by microscopic studies by preparing the slides in a drop of routine mounts (Lacto phenol, Cotton blue or Lactofuschins) and glycerin separately following different methods as handsections, microtome techniques.

Fungi with sporulating structures were observed under a compound microscope for detailed diagnostic features which aided in their identification. Fungi belonging to Ascomycetes were identified by Dennis (1978). Meliolales of India vol, I, II & III (Hosagoudar 1996, 2008, 2013) as well Asterinales of India (Hosagoudar 2012) were consulted for the identification of Black mildew fungi. Digital images were taken using Digital color CCD Camera (Nikon DS Fi1) attached to a Nikon eclipse 50i microscope with interference optics.All the holotypes are maintained in systematically in Botanical Survey of India, Western Regional Centre Herbarium, Pune and few new findings have been deposited in Ajrekar Mycological Herbarium, Pune. Descriptions of all new findings have been submitted to Mycobank.

The fungal genera and species were classified in accordance to Indexfungorum (http://www.indexfungorum.org) Species Fungorum (*w*ww.speciesfungorum.org*)* online database which are based on 10^{th} Edition of Dictionary of the Fungi by Kirk et al. 2008. These online database are also inter linked to Catalogue of Life (COL), Encyclopedia of Life (EOL), Global Biodiversity Information Facility (GBIF), Integrated Taxonomic Information System (ITIS). The changes on this website are directly associated to the advances in molecular phylogenetic analysis, because a more natural systematic classification can be obtained through molecular evidence. In this category an effort was also made to give the current name to the genera/species as directed by Species Fungorum (http://www.speciesfungorum.org). A link to the known list of both homotypic and heterotypic synonyms is displayed on the species fungorum. Although the nomenclature on these online websites is also not completely in

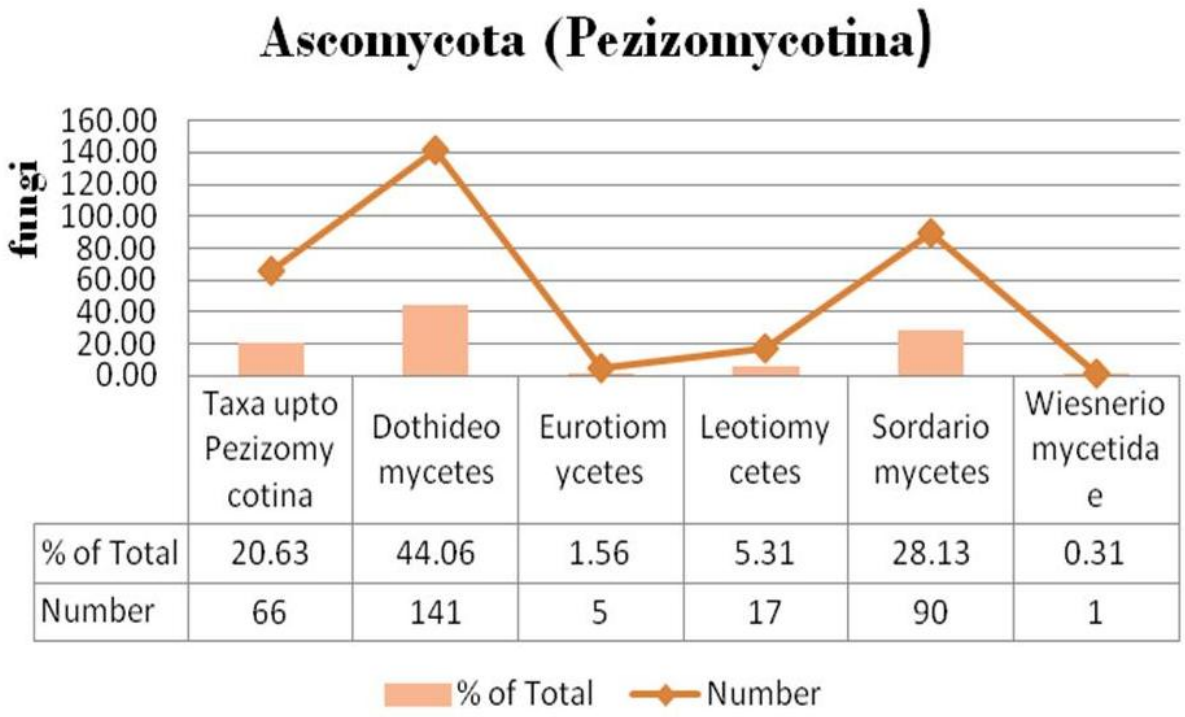
accordance with the rules and format of *International Code of Nomenclature for algae, fungi, and plants*, 2011 i.e. one fungus one name concept, but the new nomenclature is in pipeline.

RESULTS

Fungal taxa belonging to phylum Ascomycota (316 species, 04 varieties in 177 genera) ruled the fungal communities and were represented by sub phylum Pezizomycotina which were further classified into two categories: (1) Fungal taxa (66 sp. in 47 genera) upto Anamorphic Pezizomycotina (2) Fungal taxa (250 sp. &04 varieties in 130 genera) further classified in classes viz. Dothideomycetes - (140 sp. & 01 var. in 73 Genera), Eurotiomycetes (5 sp. in 4 Genera), Leotiomycetes - (17 sp. in 12 Genera), Sordariomycetes- (87 sp. & 03 var. in 40 Genera) and family Wiesneriomycetaceae (1sp. in 01 Genus) (Fig.1)

The number of fungal taxa belonging to different families of the class Dothideomycetes, Eurotiomycetes, Leotiomycetes, Sordariomycetes, were represented by bar diagram.

Critical review of the Graph reveals that majority of fungi belongs to class Dothideomycetes (140 sp & 01 variety in 73 genera,) which were further distributed among 28 fungal families. Fungal taxa (87 sp. & 03 varieties in 40 Genera) belonging to Sordariomycetes were further distributed among 17 fungal families. Fungal taxa (5 sp. in 4 genera) belonging to Class Eurotiomycetes was distributed among three families. Fungal taxa (17 sp. in 12 genera) belonging to Class Leotiomycetes were distributed among six families. The fungal genera and species were classified in accordance to Dictionary of fungi (10^{th} edition), Index fungorum (http://www.indexfungorum.org) and Mycobank (http://www.mycobank.org) online database. The changes on this websites are directly linked to the advances in molecular phylogenetic analysis, because a more natural systematic classification can be obtained through molecular evidence. Even though, the classification of fungi on these online databases is still in pipeline and thousands of fungi is still awaiting for their suitable place in modern system of classification (based on phylogeny and molecular sequencing). In this category an effort was also made to give the current name to the genera/species as directed by species fungorum (http://www.speciesfungorum.org). Although the nomenclature on these online websites is also not completely in accordance with the rules and format of *International Code of Nomenclature for algae, fungi, and plants*, 2011 i.e. one fungus one name concept, but the new nomenclature is in pipeline.



	Taxa upto Pezizomycotina	Dothideomycetes	Eurotiomycetes	Leotiomycetes	Sordariomycetes	Wiesneriomycetidae
% of Total	20.63	44.06	1.56	5.31	28.13	0.31
Number	66	141	5	17	90	1

Fig.1 Number of fungal taxa belonging to different families of phylum Ascomycota

INTERESTING FUNGAL SPECIES REPORTED DURING THE STUDIES

The most exciting and wealthy contribution of this study indeed is the discovery of two new fungal genera, 11 new fungal species. The new genera described during this period are *Sheathnema indicum* Dubey and Moonnambeth, 2014 and *Sawantomyces indica*, Dubey and Moonnambeth, 2013a. The 11 new species described during this period are: *Custingophora ratnagiriensis* Dubey & Moonambeth,2013b*; Goosiomyces bambusicola* Dubey & Moonambeth, 2014 a; *Kamalomyces mahabaleshwarensis* Dubey & Moonambeth, 2013 b;*Periconia chandoliensis* Dubey, 2017*; Solicorynespora matheransis* Dubey & Moonambeth, 2014 c; *Stigminakoyanensis* Dubey & Sengupta, 2016; *Tharoopama livistonae* Dubey & Moonambeth, 2013 c; *Tripospermummelghatensis* Dubey and Sengupta, 2016, *Vermiculariopsiella papaya* Dubey & Moonnambeth 2014 b*; Zygosporium cocos* Dubey, 2014 and *Zygosporium dilleni* Dubey, 2014 In spite of several detailed floristic investigations carried out elsewhere by other workers, a sizable number of the fungi were recorded for the first time from the country. In all, 15 taxa of micro fungi were recorded for the first time from the country as *Acarocybellina arengae* Matsush. (Dubey & Moonambeth 2013 d), *Cucurbidopthis pithyophila* (Dubey & Moonambeth 2013e), *Catenularia cubensis* Hol.-Jech.,*Hemibeltrania nectandrae* (Bat. & H. Maia) Piroz, *Idriella lunata* P.E. Nelson & S. Wilh, *Mycovellosiella solani-torvi* (Gonz. Frag. & Cif.) Deighton, *Parapericoniella asterinae*(Deighton) U., *Periconiella telopeae* (Hansf.) Ellis, (Dubey & Moonambeth 2014 d), *Phragmospathula brachyspathula* Mercado (Dubey & Moonambeth 2014 e), *Vizella oleariae* Swart. (Dubey & Moonambeth 2013 g). Of the entire recorded, it is interesting to note that more than 71 % of the total fungal isolates studied from different forest ecosystems were found on new hosts plants, thus forming new host records from India & Maharashtra (Bilgrami et al 1981, 1991, Jamaluddin *et al*.,2004 & Maheshwari et al 2012).Besides this Fungal species like *Conidiocarpus betle, Asterina woodfordiae, Cercospora blumeicola, Cercospora careyae, Meliola diospyri* were recorded after a period of 35 years or more from India. *Helicominacosti* was recorded after a period of 65 years from India.

During the course of this study, several fungal species viz.*Acrodictys balladynae* (Hansf.) M.B. Ellis, *Ampelomyces quisqualis* Ces.,*Ardhachandra cristaspora* (Matsush.) Subram. & Sudha;*Amazonia elaeocarpi* Hosag., D.K. Agarwal, H. Biju & Archana;*Asterina delicatula* Syd., P. Syd. & Bal; *Asterina hydrocotyles* Hosag. & C.K. Biju,*Balladyna vanderystii* (Hansf.) Arx.; *Cercospora apii* Fresen.;*Capnodium* sp.; *Beltrania rhombica* Penz;*Chaetomella acutiseta* B. Sutton & A.K. Sarbhoy; *Cladosporium spongiosum* Berk. & M.A. Curtis*Corynespora cassicola* (Berk & Curt.) Wei; *Dictyosporium elegans* Corda*; Craspedodidymum* sp., *Gonatophragmium mayteni S.K. Singh, L.S. Yadav & P.N. Singh, Graphium* sp.*;Heteropatella lacera* Fuckel*; Helicomina costi* M.A. Salam & P.N. Rao*; Isthomospore state of Trichothyrium asterophorum* (Berk. & Broome) Hohn., *Khuskia oryzae* H.J. Huds., *Kirschsteiniothelia* atra (Corda) D. Hawksw.,*Meliola carissae var. spinari* Hosag.*; Monostichella indica* B. Sutton*; Neopestalotiopsis asiatica* (Maharachch. & K.D. Hyde)*; Maharachch.*, K.D. Hyde & Crous, *Passalora desmanthi* (Ellis & Kellerm.) U. Braun,*Pithomyces ellisii* V.G. Rao & Chary, *Pseudocochliobolus pallescens* Tsuda & Ueyama, *Ramularia vitis* Sydow, *Sarcinella gymnosporiae* Subhedar & Rao ex Hosag., *Scolecostigmina fici-elasticae* (J.N. Kapoor) U. Braun,*Stauronema sacchari* Syd., P. Syd. & E.J. Butler, *Vizella oleariae* Swart., *Trichothecium roseum; Spiropes melanoplaca* (Berk. & M.A. Curtis) M.B. Ellis; *Zasmidium rubiacearum S.* Chaudhary, N. Sharma & Kamal. Table 1 & Fig 2- 7 also reports new records of Fungi to Maharashtra.

Table 1: List of Fungal spp. documented during the studies.

Sr. No.	Fungal taxa	Position in Classification as per Index Fungorum database 2016	Host plants	Collection No. -BSI (WC)	Collection sites	Date of collection	New records
1.	*Acrodictys balladynae* (Hansf.) M.B. Ellis	Anamorphic Pezizomycotina	*Catunaregam spinosa* (Thunb.) Tirveng.	200993	Kilabda-Rajapura, Ratnagiri	24.01.2013	New record of the fungus to Maharashtra
2.	*Amazonia elaeocarpi* Hosag., D.K. Agarwal, H. Biju & Archana	Meliolaceae	*Leea indica* (Burm. f.) Merr.	200117	Kesari, Sindhudurg	21.01.2012	New record of the fungus to Maharashtra
3.	*Ampelomyces quisqualis* Ces.	Phaeosphaeriaceae	*Malachra capitata* (L.) L.	201161	Tansa WLS, Thane Dist.	19.10.2012	
4.	*Ardhachandra cristaspora* (Matsush.) Subram. & Sudha	Herpotrichiellaceae	*Leea indica* (Burm. f.) Merr.	199654	Apur, Bhimashankar WLS	29.09.2011	
5.	*Ardhachandra cristaspora* (Matsush.) Subram. & Sudha	Herpotrichiellaceae	*Syzygium cumini* (L.) Skeels	199568	Bhushi Dam, Lonavala	26.09.2011	
6.	*Asterina delicatula* Syd., P. Syd. & Bal	Asterinaceae	*Jasminum* sp.	200075	Sawantwadi, Sindhudurg	20.01.2012	New record of the fungus to Maharashtra
7.	*Asterina hydrocotyles* Hosag. & C.K. Biju	Asterinaceae	*Lawsonia inermis* L.	196234	Junnar Forest, Pune Dist.	21.09.2013	New record of the fungus to Maharashtra
8.	*Balladyna vanderystii* (Hansf.) Arx.	Parodiopsidaceae	*Catunaregam spinosa* (Thunb.) Tirveng.	200993	Khondwal, Bhimashankar WLS, Pune Dist.	29.09.2011	New record of the fungus to Maharashtra
9.	*Beltrania rhombica* Penz.	Anamorphic	*Mangifera indica*L.	196504	Metindoli, Koyna WLS,	17.11.2013	

		Pezizomycotina			Satara Dist.		
10.	*Capnodium* sp.	Capnodiaceae	*Psidium guajava* L.	196490	Phansad WLS, Raigad	28.09.2013	
11.	*Cercospora apii* Fresen.	Mycosphaerellaceae	Fern	196374	On the way to Sanjay Gandhi, Mumbai	24.09.2013	
12.	*Cercospora apii* Fresen.	Mycosphaerellaceae	*Impatiens balsamina* L.	199551	Khandala, Pune Dist.	26.09.2011	
13.	*Chaetomella acutiseta* B. Sutton & A.K. Sarbhoy	Mycosphaerellaceae	*Bambusa bambos* (L.) Voss	194271	Mundhwa Garden,BSI Pune	30.10.2013	New record of the fungus to Maharashtra
14.	*Cladosporium spongiosum* Berk. & M.A. Curtis	Cladosporiaceae	*Casaeria* sp.	200241	Vengrula, Sindhudurg Dist.	22.01.2012	
15.	*Corynespora cassicola* (Berk & Curt.) Wei	Corynesporascaceae	*Dregea volubilis* (L.f.) Benth. ex Hook.f.	200115	Kesari, Sawantwadi Sindhudurg Dist.	21.01.2012	
16.	*Craspedodidymum* sp.	Chaetosphaeriaceae	*Bridelia* sp.	201750	Koyna WLS, Satara Dist.	13.02.2015	
17.	*Dictyosporium elegans* Corda	Anamorphic Pezizomycotina	*Roystonea regia* (Kunth) O.F.Cook	194289	BSI Campus, Pune	30.10.2013	
18.	*Gonatophragmium mayteni* S.K. Singh, L.S. Yadav & P.N. Singh	Acrospermaceae	Unidentified Leguminosae sp. 2	201028	On the way to Jhap, Thane Dist.	16.10.2012	

19.	*Graphium* sp.	Microascaceae	*Macaranga peltata* (Roxb.) Müll.Arg.	201095	Dahanu, Thane Dist.	17.10.2012	
20.	*Heteropatella lacera* Fuckel	Helotiaceae	Unidentified plant sp. 6	196499	BSI Campus, Pune	30.10.2014	New record of fungus to Maharashtra
21.	*Helicomina costi* M.A. Salam & P.N. Rao	Mycosphaerellaceae	*Costus speciosus* Konig	196398	Raigad Forest	25.09.2013	Reported after 60 years and also a New record of the fungus to Maharashtra
22.	*Isthomospore* state of *Trichothyrium asterophorum* (Berk. & Broome) Höhn.	Microthyriaceae	*Lagerstromia* sp.	200371	Pasarni Ghat, Satara Dist.	25.01.2012	New record of the fungus to Maharashtra
23.	*Khuskia oryzae* H.J. Huds.	Trichosphaeriales	Unidentified Poaceae species 5	194274	Ratnagiri	24.01.2013	
24.	*Kirschsteiniothelia atra* (Corda) D. Hawksw.	Dothideomycetes	*Albizia saman* (Jacq.) Merr.	194104	BSI Campus, Pune	26.03.2012	
25.	*Meliola carissae* var. *spinari* Hosag.	Meliolaceae	*Carissa spinarum* L.	201027	On the way to Jhap, Thane Dist.	16.10.2012	New record of the fungus to Maharashtra
26.	*Meliola mitragynae* Syd. & P. Syd.	Meliolaceae	*Mitragyna parvifolia* (Roxb.) Korth.	196410	Sanjay Gandhi NP, Mumbai	25.09.2013	New record of the fungus to Maharashtra
27.	*Monostichella indica* B. Sutton	Helotiales	*Holarrhena pubescens* Wall. ex G.Don	199520	Khandala	25.09.2011	New record of fungus to Maharashtra

28.	*Neopestalotiopsis asiatica* (Maharachch. & K.D. Hyde) Maharachch., K.D. Hyde & Crous	Amphisphaeriaceae	*Carissa spinarum* L.	201039	Shikur,Thane Dist.	16.10.2012	
29.	*Passalora desmanthi* (Ellis & Kellerm.) U. Braun	Mycosphaerellaceae	*Tinospora sinensis* (Lour.) Merr.	201082	On the way to Dahanu, Dahanu, Thane Dist.	17.10.2012	New record of the fungus to Maharashtra
30.	*Pithomyces ellisii* V.G. Rao & Chary	Pleosporaceae	*Memecylon umbellatum* Burm. f.	201013	On the way to Jhap, Thane Dist.	16.10.2012	
31.	*Pseudocochliobolus pallescens* Tsuda & Ueyama	Pleosporaceae	*Euphorbia neriifolia* L.	196653	Nandurbar	21.09.2014	
32.	*Ramularia vitis* Sydow	Mycosphaerellaceae	*Vitex negundo* L.	201771	Koyna WLS	13.02.2015	New record of fungus to Maharashtra
33.	*Sarcinella gymnosporiae* Subhedar & Rao ex Hosag.	Englerulaceae	Unidentified Plant sp.10	201099	On the way to Dahanu, Dahanu, Thane Dist.	17.10.2012	
34.	*Scolecostigmina fici-elasticae* (J.N. Kapoor) U. Braun	Mycosphaerellaceae	*Ficus benghalensis* L.	200373	Pasarni Ghat, Satara Dist.	25.01.2012	
35.	*Spiropes melanoplaca* (Berk. & M.A. Curtis) M.B. Ellis		*Volkameria inermis* L.	200085	Chillara, Sawantwadi Sindhudurg Dist.	21.01.2012	New record of the fungus to Maharashtra
36.	*Stauronema sacchari* Syd., P. Syd. & E.J. Butler	Anamorphic Pezizomycotina	*Coix lacryma-jobi* L.	201005	On the way to Jhap, Thane Dist.	16.10.2012	New record of the fungus to Maharashtra

37.	*Trichothecium roseum* (Pers.) Link	Hypocreales	*Phyllanthus* sp.	199615	Taleghar, Bhimashankar WLS	28.09.2011	
38.	*Vizella oleariae* Swart.	Vizellaceae	*Embothrium coccineum* J.R.Forst . & G.Forst.	200103	Kesari, Sawantwadi, Sindhudurg	21.01.2012	New record of the fungal species to India
39.	*Zasmidium rubiacearum* (S. Chaudhary, N. Sharma & Kamal) Kamal	Mycosphaerell-aceae	*Meyna laxiflora* Robyns	201018	On the way to Jhap, Thane Dist.	16.10.2012	New record of the fungus to Maharashtra

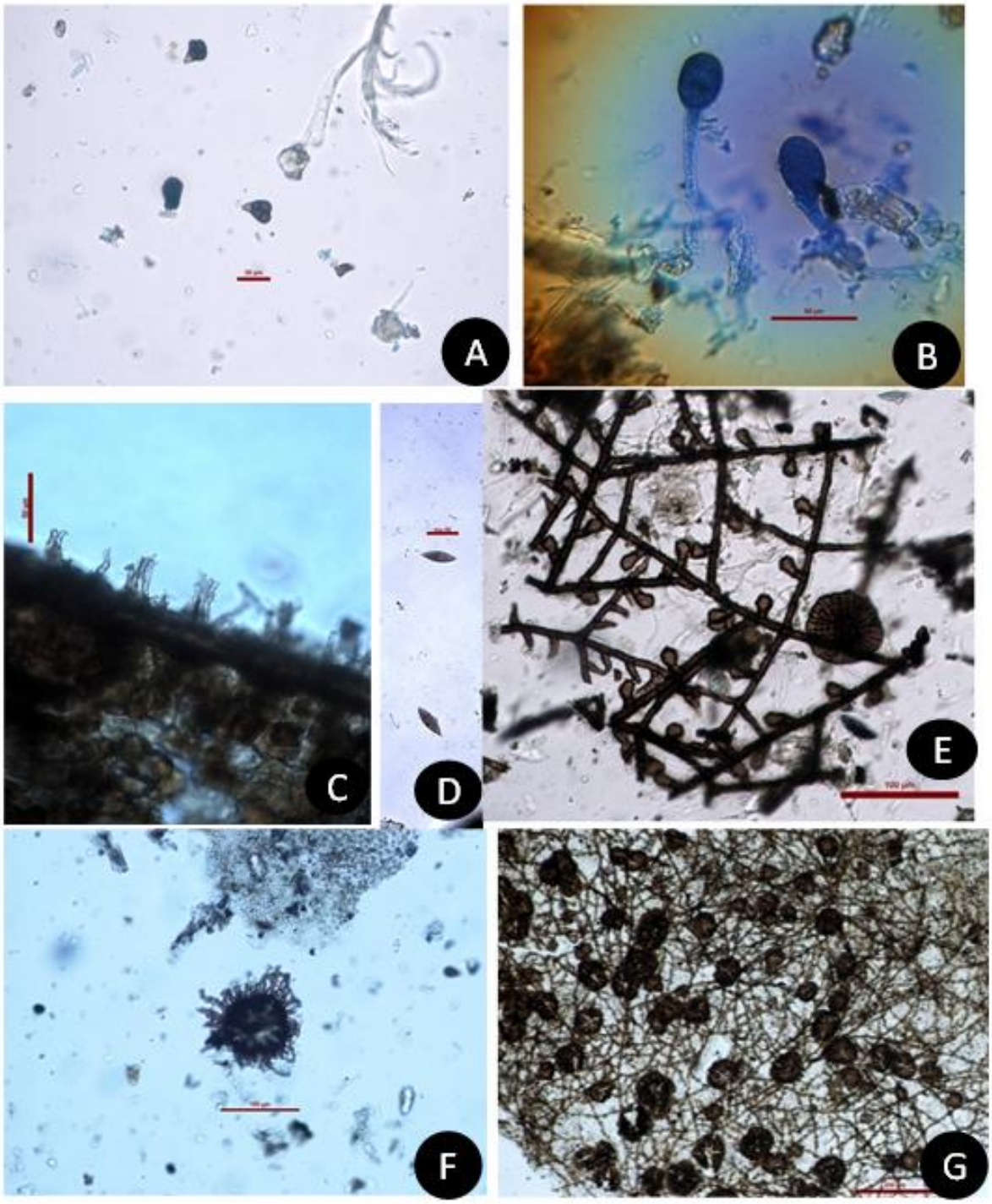


Fig. 2:A. *Acrodictys balladynae* (Hansf.) M.B. Ellis, B. *Ampelomyces quisqualis* Ces., C. and D. *Ardhachandra cristaspora* (Matsush.) Subram. & Sudha, E. *Amazonia elaeocarpi* Hosag., D.K. Agarwal, H. Biju & Archana, F. *Asterina delicatula* Syd., P. Syd. & Bal, G. *Asterina hydrocotyles* Hosag. & C.K. Biju .

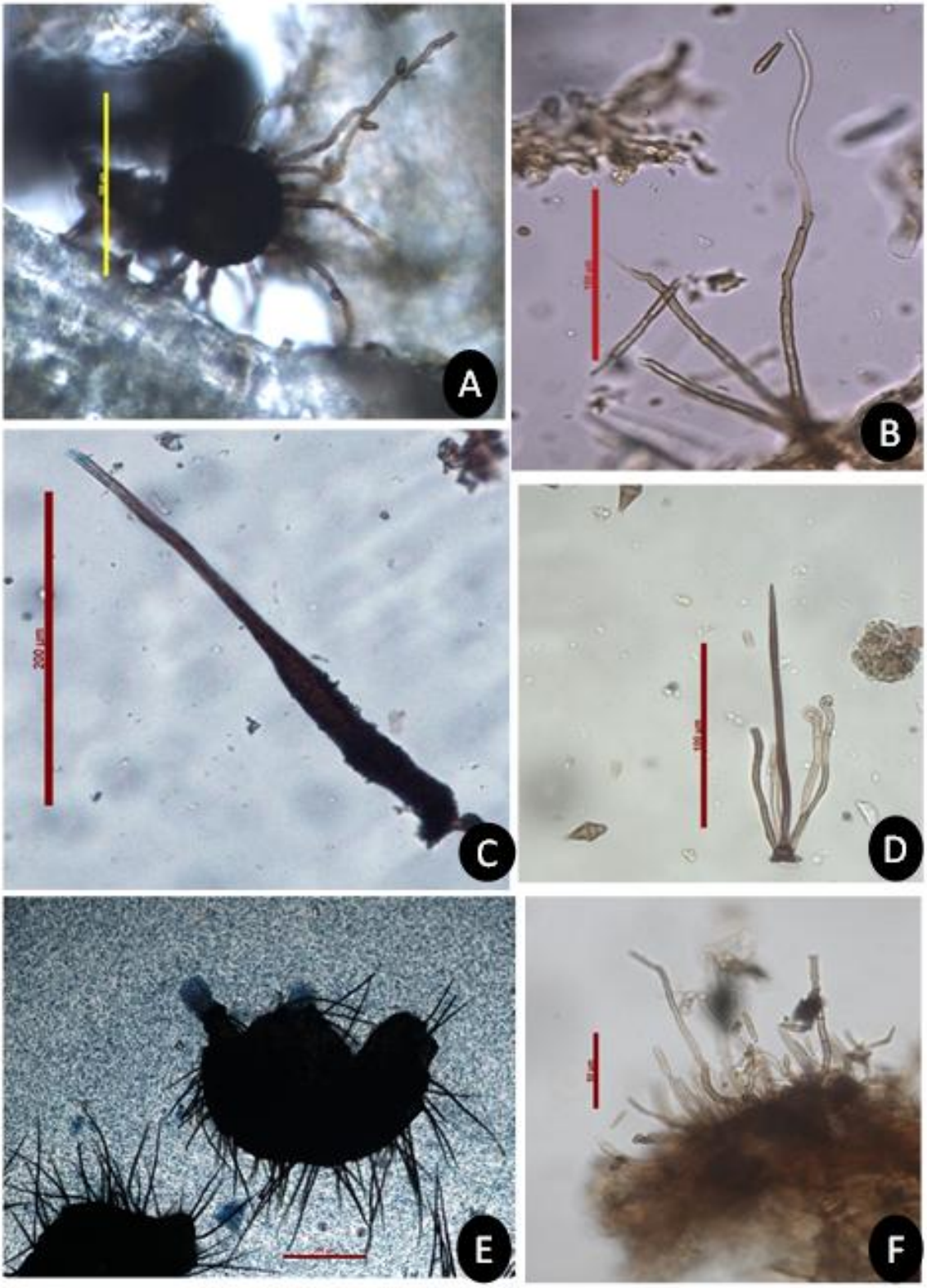


Fig. 3 : A. *Balladyna vanderystii* (Hansf.) Arx., B. *Cercospora apii* Fresen. C. *Capnodium* sp., D. *Beltrania rhombica* Penz., E. *Chaetomella acutiseta* B. Sutton & A.K. Sarbhoy, F *Cladosporium spongiosum* Berk. & M.A. Curtis

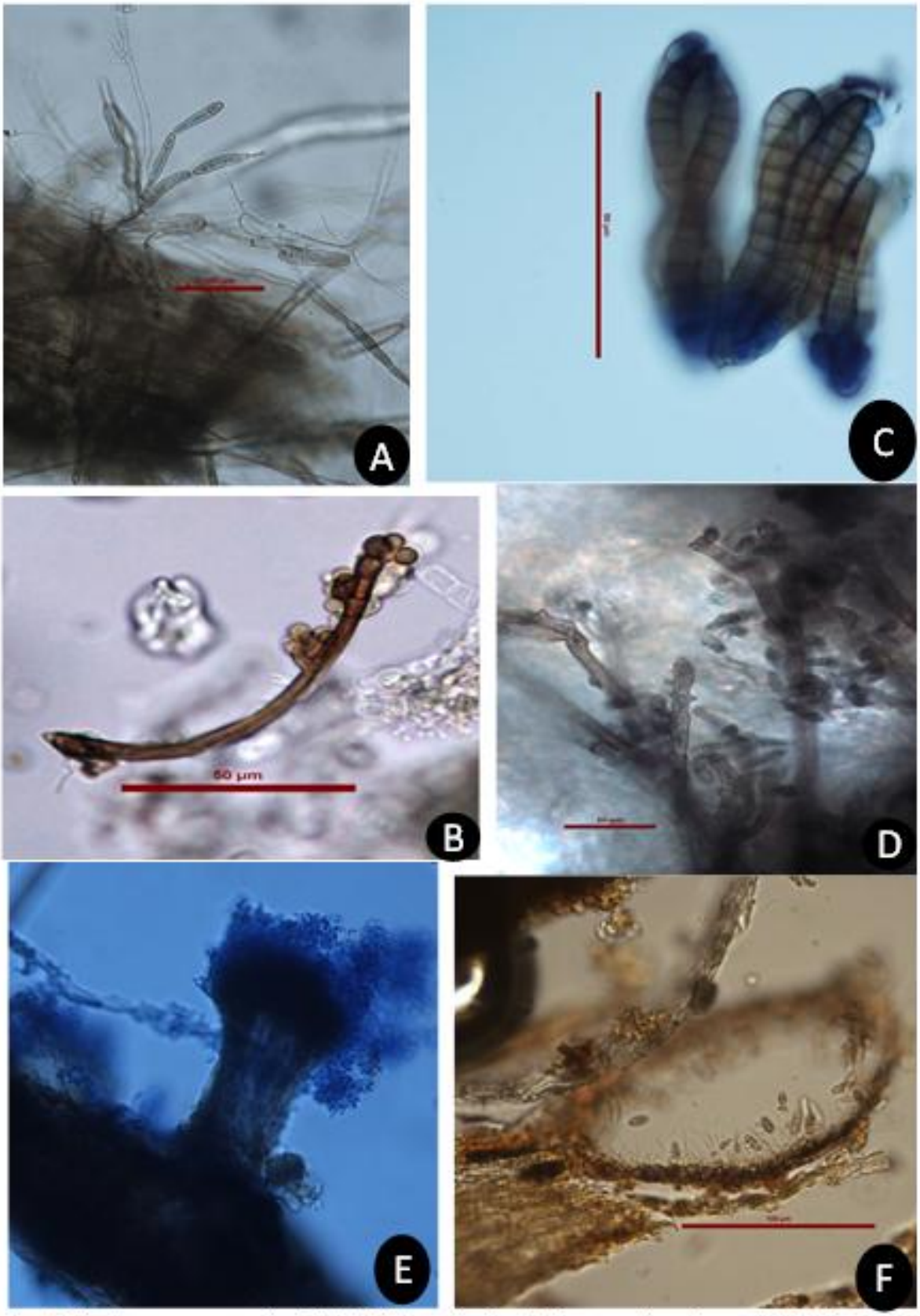


Fig. 4: A. *Corynespora cassicola* (Berk & Curt.) Wei, B. *Dictyosporium elegans* Corda C. *Craspedodidymum* sp., D. *Gonatophragmium mayteni* S.K. Singh, L.S. Yadav & P.N. Singh, E. *Graphium* sp., F. *Heteropatella lacera* Fuckel.

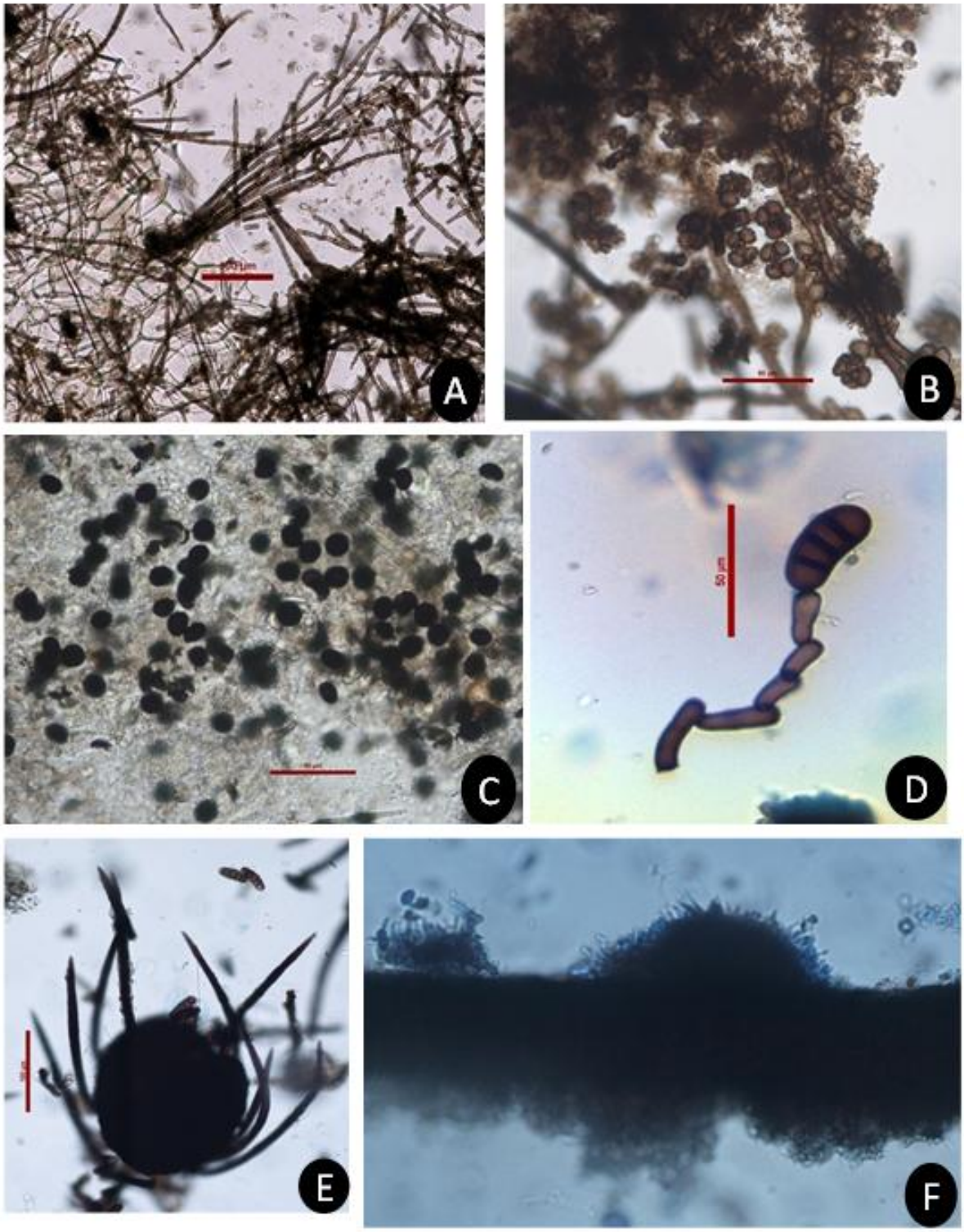


Fig. 5: A. *Helicomina costi* M. A. Salam & P.N. Rao B. *Isthmospore* state of *Trichothyrium asterophorum* (Berk. & Broome) Höhn., C. *Khuskia oryzae* H.J. Huds., D. *Kirschsteiniothelia atra* (Corda) D. Hawksw., E. *Meliola carissae* var. *spinari* Hosag., F. *Monostichella indica* B. Sutton.

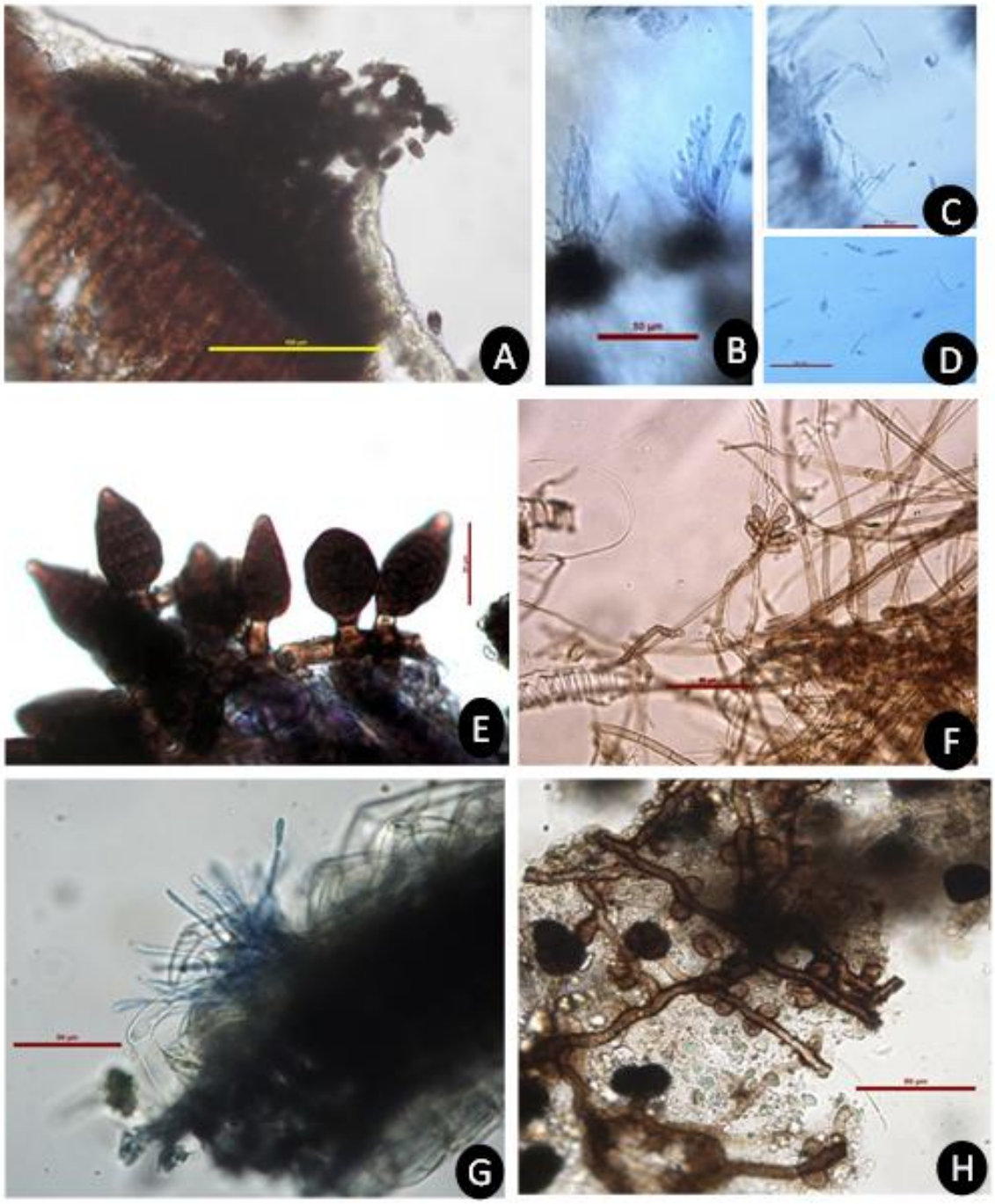


Fig.6: A. *Neopestalotiopsis asiatica* (Maharachch. & K.D. Hyde) Maharachch., K.D. Hyde & Crous, B-D. *Passalora desmanthi* (Ellis & Kellerm.) U. Braun, E. *Pithomyces ellisii* V.G. Rao & Chary, F. *Pseudocochliobolus pallescens* Tsuda & Ueyama , G. Ramularia vitis Sydow , H. *Sarcinella gymnosporiae* Subhedar & Rao ex Hosag.

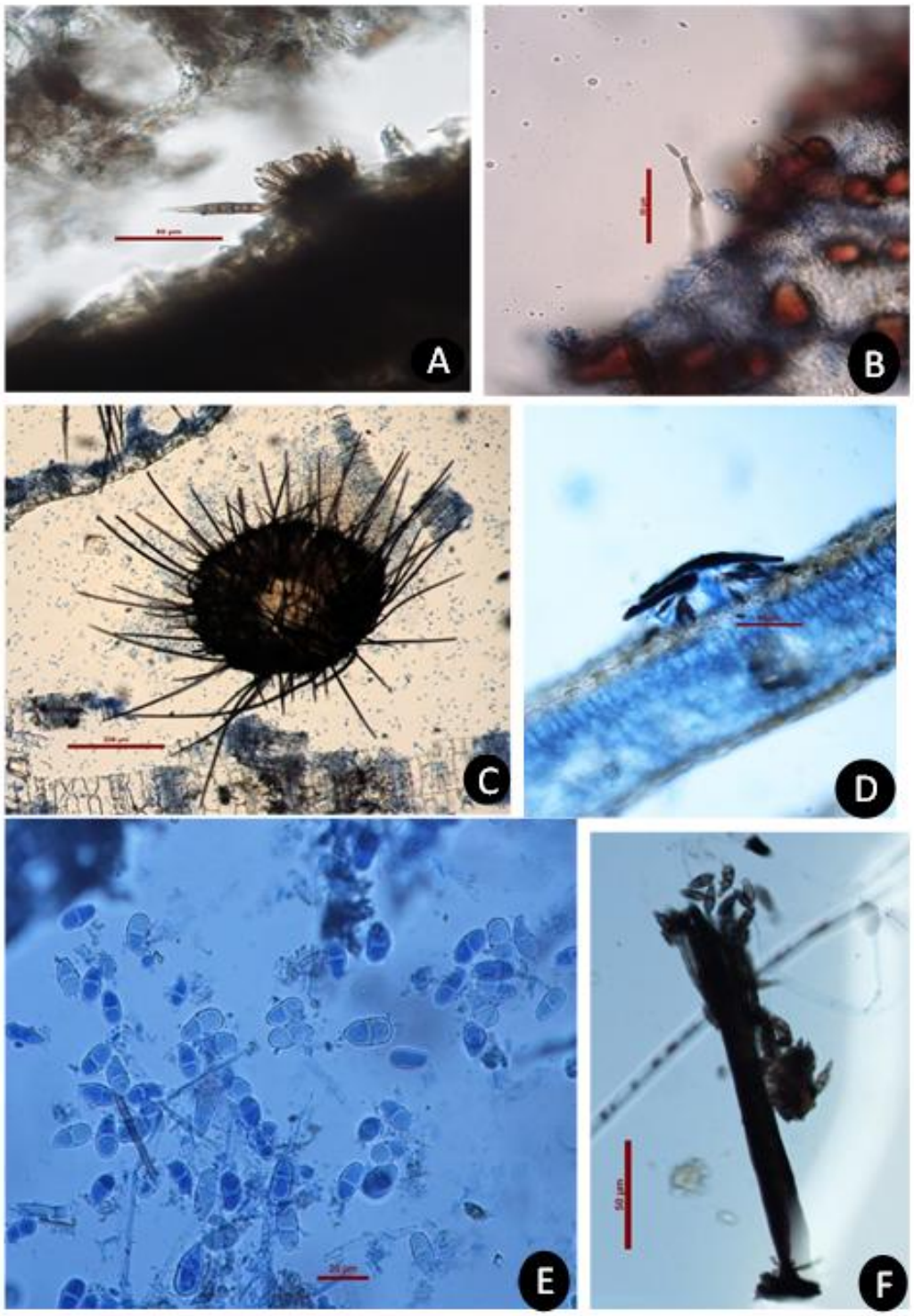


Fig. 7 : A. *Scolecostigmina fici-elasticae* (J.N. Kapoor) U. Braun, B. *Zasmidium rubiacearum* (S. Chaudhary, N. Sharma & Kamal, C. *Stauronema sacchari* Syd., P. Syd. & E.J. Butler, D. *Vizella oleariae* Swart., E. *Trichothecium roseum* (Pers.) Link, F. *Spiropes melanoplaca* (Berk. & M.A. Curtis) M.B. Ellis

CONCLUSION

Sufficiently large collection of specimens, documentation and descriptions of a number of novel taxa of microfungi from the Western Ghats, indicate that we have incredible fungi in our area. Floristic details and biological associations when investigated systematically, as done in this study, a treasure of information gets unfolded before us. It is something like nature revealing secrets before us. It was examined that very low number of fungal species have been reported earlier, which reflects

the small study efforts made to map them. Although it was assumed that the pleomorphic nature of fungi has been found adding to the complexity of classification. It is almost impossible to replace the volumes of classical studies gone into the studies on fungi by molecular phylogenetic approaches, within a short time because morphology-based diagnosis and classification of fungi has been the foundation of taxonomic mycology with several iconic publications coming out time to time, describing all groups of fungi. Nevertheless, efforts are being made to rectify the confusions arouse and the studied fungal species were arranged and classified in accordance to Index fungorum and the name of the species was also updated. Thus, the present work not only provides basic understandings about the morhotaxonomic classification of fungi but also provides a foundation stone for Integrated Taxonomic approach.

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