

Some hyphomycetous fungi from Andhra Pradesh and Telangana, India

C. Manoharachary*¹ and D. Nagaraju²

¹*Mycology and Molecular Plant Pathology Laboratory, Department of Botany, Osmania University, Hyderabad 500 007, Telangana, India.*

²*Department of Botany, Govt. City College (A), Hyderabad, Telangana, India*

*Corresponding author Email: cmchary@gmail.com

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ABSTRACT

In the present investigation, dry deciduous scrub and mixed forests, Eastern Ghats, and other regions of Telangana and Andhra were surveyed for hyphomycetous fungi during 2010-2020. Out of 105 fungi identified, *Aspergillus* was represented by 11 species, followed by *Penicillium* with 10 species, *Curvularia* 5 species, *Periconia* with 4 species, *Stachybotrys* having 3 species and all other genera were represented by 1 to 3 species. Out of 105 fungi reported, only 32 species were new additions to the fungi of Andhra Pradesh and Telangana. Interestingly, the forest localities of Bhadrachalam, Yellendu, and Khammam along with Hyderabad harbored more fungal species than others. It is concluded that there is a hidden wealth of fungi in Andhra Pradesh and Telangana forest localities that need in-depth study.

Keywords : Andhra Pradesh, fungal diversity, hyphomycetous, forest habitats, Telangana.

INTRODUCTION

Fungal diversity is an asset and is an enduring resource for supporting not only biotechnology but also the sustained existence of human beings. It has been estimated that 2.2-3.8 million fungi occur in the globe as per Hawksworth and Lucking (2017). Recently, Wu *et al.* (2019) reported 13 million fungi as a global estimate. Only 5% of fungal world wealth has been understood taxonomically. Manoharachary *et al.* (2005, 2009) have mentioned that around 29,000 fungal species have been reported from India till now, out of 1,40,000 fungal species described from all over the world. Interestingly, only 5-7 % of fungi are found to be culturable while remaining 93% of fungi need to be cultured. It is important to mention that fungi form an important component in agriculture, industry, medicine, waste management, biotechnology, the food industry, and other activities related to human welfare.

MATERIALS AND METHODS

Hyphomycetous fungi were collected from forest localities of Ananthagiri Hills, Vikarabad (Scrub forest), Bhadrachalam, Narsapur, forest (Dry deciduous forest), Warangal, Kakinada, Rajamundry, Srikakulam, East and West Godavari, Visakhapatnam, Ananthapuram, Tirupati, and Vijayawada areas (tropical forests and shrub forest vegetation) of Andhra Pradesh and Telangana, India for a period of ten years (2010-

2020). The fungal specimen was prepared as per the procedures described by Hawksworth (1974).

Final identification of hyphomycetous fungi was done with the help of keys, manuals, and available literature (Ellis, 1971, 1976; Subramanian, 1971; Ellis and Ellis, 1998; Nagamani *et al.*, 2006; Bhat, 2010).

All the collected fungi have been deposited in the internationally recognized Osmania University Fungal Herbarium (OUFH), Botany Department. Some interesting fungal cultures and herbarium specimens have been deposited at HCIO (Herbarium Cryptogamie Indiae Orientalis), Division of Plant Pathology, IARI, New Delhi.

RESULTS AND DISCUSSION

Altogether, 105 hyphomycetes fungal species were collected from various locations of Andhra Pradesh and Telangana, India. Out of these, *Aspergillus* was represented by 11 species, *Penicillium* by 10 species, *Curvularia* by 5 species, *Periconia* by 4 species, *Stachybotrys* and *Tritirachium* by 3 species each while *Acremonium*, *Alternaria*, *Beltrania*, *Cladosporium*, *Dictyoarthrinium*, *Graphium*, *Gyrophthrix*, *Paecilomyces*, *Phaeoisaria*, *Spegazzinia*, *Trichoderma*, *Trimmatostroma*, and *Ulocladium* were represented by 2 species each. Remaining genera had only one species each (**Table 1; Fig. 1**).

Table 1: List of fungi collected from different localities of Andhra Pradesh and Telangana

S. No	Name of the Fungal Species	Habitat	Locality	Accession No
1.	* <i>Acremonium chrysogenum</i> (Thurum. & Sukap.) Gams	Leaves	Bhadrachalam, Yellendu forest of Khammam district	HCIO No. 42996
2.	* <i>Acremonium strictum</i> W. Gams	<i>Andrographis paniculata</i>	Hyderabad	OUFH 181
3.	* <i>Acrogenospora sphaerocephala</i> (Berk. & Br.) Ellis	Wood, bark	Bhadrachalam, Kothagudem forests of Khammam district	HCIO No. 42998
4.	* <i>Acrophialophora fusispora</i> (S.B. Saksena) Samson	Soil (eggplant)	Hyderabad	OUFH 9
5.	<i>Alternaria porri</i> (Ellis) Cif.	<i>Acalypha indica</i>	Secunderabad	OUFH 187
6.	<i>Alternaria brassicicola</i> (Schwein) Wiltshire	Rhizosphere soil	Hyderabad	OUFH 13
7.	<i>Amorphotheca resiniae</i> Pabery.	Forest soil	Mannanur	OUFH 16
8.	* <i>Arthrinium euphorbiae</i> Ellis	Soil	Hyderabad	OUFH 17
9.	* <i>Arthrobotrys folicola</i> Matsushima	Moist leaves	Medak Adilabad Nalgonda	HCIO No.43000

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10.	<i>Aspergillus amstelodami</i> (Mangin) Thom and Church	Forest soil	Visakhapatnam	OUFH 21
11.	<i>Aspergillus brunneouniseriatus</i> Singh & Bakshi	Deciduous forest soil	Mannanur	OUFH 23
12.	<i>Aspergillus candidus</i> Link	Pond mud	Nizamabad	OUFH 25
13.	<i>Aspergillus chevalieri</i> (Mangin) Thom and Church	Soil	Vikarabad	OUFH 26
14.	* <i>Aspergillus deflectus</i> Fennell & Raper	Forest, wild, cultivated soils	Vijayawada	OUFH 28
15.	<i>Aspergillus flavipes</i> (Bainier & Sartory) Thom & Church	Forest, wild, cultivated soils	Nizamabad	OUFH 31
16.	<i>Aspergillus flavus</i> Link	Forest, wild, cultivated soils	Adilabad	OUFH 32
17.	<i>Aspergillus japonicas</i> Saito	Forest, wild, cultivated soils	Vijayawada	OUFH 38
18.	<i>Aspergillus niger</i> Tiegh.	Rhizosphere soil (peanut)	Tirupati, Mahbubnagar	OUFH 42
19.	<i>Aspergillus terreus</i> Thom	Pond mud	Prakasam	OUFH 53
20.	<i>Aspergillus ustus</i> (Bain) Thom & Church	Forest, wild, cultivated soils	Ananthapuram	OUFH 55
21.	<i>Aureobasidium pullulans</i> (de Bary) Arnaud	Forest, cultivated soils	Ananthapuram, Mahbubnagar	OUFH 58
22.	<i>Beltrania rhombica</i> Penz	Wild soil	Narsapur	OUFH 60
23.	<i>Beltrania rhombica</i> var. <i>indica</i> Manohar. et al.	Litter	Kothagudem	OUFH 717
24.	<i>Beltraniella odinae</i> Subram.	Litter	Bayaram	OUFH 715
25.	* <i>Beltraniopsis esenbeckiae</i> Bat. & J.L. Bezerra	Litter	Yellandu	OUFH 718
26.	<i>Bhadradriella hyaline</i> Nagaraju, Kunwar, Sureshk. & Manohar	<i>Roystonea regia</i> pod	Bhadrachalam	HCIO No. 50143
27.	<i>Cephaliophora irregularis</i> Thaxter	Cultivated soil (castor)	Mahbubnagar	OUFH 69
28.	<i>Custingophora lignicola</i> Nagaraju, Kunwar, Sureshk. & Manohar.	<i>Acacia auriculiformis</i> leaf	Bhadrachalam	HCIO. No 50146
29.	* <i>Cylindrocladium braziliense</i> (Bat. & Cif.) Peeraly	<i>Eucalyptus</i> leaf	Bhadrachalam	OUFH 736
30.	<i>Cladosporium cladosporioides</i> (Fresen.) G.A. de Vries	<i>Asperagus recemosus</i> Stem	Hyderabad	OUFH. 188
31.	<i>Cladosporium herbarum</i> (Pers) Link	Rhizosphere soil	Mannanur	OUFH 96
32.	<i>Corynespora cassicola</i> (Berk. & M.A. Curtis) C.T. Wei	<i>Ocimum tenuiflorum</i> Leaf/ Stem	Vikarabad	OUFH. 200
33.	* <i>Curvularia eragrostidis</i> (Henn.) J.A. Mey	<i>Ficus hispida</i> Leaf	Hyderabad	OUFH. 202
34.	<i>Curvularia lunata</i> var. <i>aeria</i> (Bat J.A. Lima & C.T. Vascon) M.B. Ellis	Forest, wild, cultivated soils	Ananthagiri	OUFH 118
35.	* <i>Curvularia prasadii</i> Mathur & Mathur	Soil (spinach)	Hyderabad	OUFH 119
36.	<i>Curvularia trifolii</i> (Kauffman) Boedijin	Forest, wild, cultivated soils	Vikarabad	OUFH 120
37.	* <i>Curvularia senegalensis</i> (Speg.) Subram.	<i>Aloe vera</i> Leaf	Adilabad	OUFH. 204
38.	<i>Comatricha equalis</i> Peck	Litter	Bhadrachalam	HCIO No. 43003
39.	* <i>Cylindrocladium scoparium</i> Morgan	Leaves	Medak, Adilabad, Khammam, Srikakulam District	HCIO No. 43005
40.	<i>Deightoniella torulosa</i> (Syd.) Ellis	<i>Albizzia amara</i> stem	Nalgonda, Warangal, Adilabad Narsapur	OUFH. 156
41.	<i>Dendryphiopsis atra</i> (Corda) Hughes	Decaying debris	Adilabad, Medak, Karimnagar, Warangal, Bhadrachalam, Yellandu, Aswaraopet of Khammam district	HCIO No. 43006
42.	<i>Dictyoarthrinium sacchari</i> Steve. ex Johnson & Stevenson	Litter	A.P	HCIO No. 43007
43.	<i>Dictyoarthrinium</i> sp.	Pond mud soil	Vikarabad	OUFH 123
44.	<i>Fusarium chlamyosporum</i> Wollenw & Reinking	River bank soil	Nizamabad	OUFH 134
45.	* <i>Fusariella hughesii</i> Chab.-Frydm.	<i>Achyranthes aspera</i> Leaf/ Petiole	Hyderabad	OUFH 206
46.	* <i>Geosmithia lavendula</i> (Raper & Fennell) Pitt	Soil	Hyderabad	OUFH 140

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47.	<i>*Gonytrichum microcladium</i> (Sacc.) Hughes	Litter	Srikakulam, Visakhapatnam, Bhadrachalam, Yellandu forests of Khammam District	HCIO No. 43010
48.	<i>*Graphium penicillioides</i> Corda	Forest, wild, cultivated field	Ananthagiri	OUFH 152
49.	<i>*Graphium putredinis</i> (Corda) S. Hughes	Soil	Hyderabad	OUFH 153
50.	<i>Gyothyrix hughesii</i> Pirozynski	<i>Eucalyptus</i> sp. leaf	Bhadrachalam	OUFH 745
51.	<i>Gyothyrix podosperma</i> (Corda) Rabenh.	Litter	Yellandu	OUFH 746
52.	<i>Hansfordia giciella</i> (Sacc.) Hughes	Litter	Bhadrachalam, Yellandu forests of Khammam, Warangal, Nizamabad Districts	HCIO No. 43012
53.	<i>Helicomycetes hyderabadensis</i> P. Rag Rao & D. Rao	<i>Samania</i> sp. fruit	Dummugudem	OUFH 747
54.	<i>Hyaloccephalotrichum indica</i> Nagaraju, Kunwar, Sureshk. & Manohar.	Fruit	Paloncha	HCIO. No 50144
55.	<i>*Idriella angustispora</i> Morgam-Jones	Litter	Kothagudem	OUFH 748
56.	<i>Melanocephala cupulifera</i> S. Hughes	Decaying wood	Warangal, Karimnagar, Bhadrachalam, Yellandu	HCIO No. 43016
57.	<i>Memnoniella echinata</i> (Riv.) Galloway	Twigs, bark	Warangal, Ashwaraopet, Bhadrachalam, Yellandu	HCIO No. 43017
58.	<i>Menisporopsis theobomae</i> Hughes	Leaf litter	Adilabad, Medak, Nalgonda, Khammam	HCIO No. 43018
59.	<i>*Olphitrichum patulum</i> (Sacc. and Berl.) Holubova-Jechova	Litter	Visakapatnam, Kakinada, Rajmundry, Bhadrachalam, Ashwaraopet	HCIO No. 43020
60.	<i>Paecilomyces lilacinus</i> (Thom) Samson	Pond mud	Hyderabad	OUFH 194
61.	<i>Paecilomyces variotii</i> Bainier	Soil	Tirupati	OUFH 195
62.	<i>Penicillium adametzi</i> Zaleski	Soil	Hyderabad	OUFH 196
63.	<i>Penicillium citrinum</i> Thom	Cultivated field	Hyderabad	OUFH 200
64.	<i>Penicillium commune</i> Thom	Forest, wild, cultivated soils	Ananthagiri	OUFH 201
65.	<i>Penicillium funiculosum</i> Thom	Forest, wild, cultivated soils	Ananthagiri	OUFH 207
66.	<i>*Penicillium herquei</i> Bainier & Sartory	Rhizosphere, soil (spinach)	Hyderabad	OUFH 209
67.	<i>Penicillium italicum</i> Stoll	Polluted soil	Hyderabad	OUFH 212
68.	<i>Penicillium rubrum</i> Stoll	Forest, wild, cultivated soils	Ananthagiri	OUFH 223
69.	<i>Penicillium turbatum</i> Westling	Pond mud	Vikarabad	OUFH 228
70.	<i>Penicillium vinaceum</i> Gilman & Abbott	Pond mud soil	Hyderabad	OUFH 230
71.	<i>*Penicillium viridicatum</i> Westling	Forest soil	Narsapur	OUFH 231
72.	<i>Pathramaya sundara</i> Subr.	<i>Aegle marmelos</i> Leaf	Warangal	OUFH 216
73.	<i>Periconia byssoides</i> Pers.	<i>Clerodendron infortunatum</i> Leaf	Eturnagaram	OUFH 217
74.	<i>*Periconia atropurpurea</i> (Berk. & Curt.) Litnov	<i>Borassus fabellifera</i>	Nizamabad, Parkhal, Nirmal, Bhadrachalam, Yellandu, Ashwaraopet of Khammam Dist.	HCIO No. 43022
75.	<i>Periconia cookei</i> Mason and Ellis	Twig, leaf litter	Adilabad, Nizamabad, Nalgonda, Bhadrachalam, Yellandu, Ashwaraopet	HCIO No. 43024
76.	<i>*Periconia saraswatipurensis</i> Bilgrami	Pond mud	Vikarabad	OUFH 234
77.	<i>Phaeoisaria clematidis</i> (Fuckel) Hughes	Fallen leaves	Nizamabad, Adilabad, Kakinada, Srikakulam, Bhadrachalam, Yellandu, Ashwaraopet of Khammam Dist.	HCIO No. 43027
78.	<i>Phaeoisaria clematidis</i> (Fuckel) Hughes	Fallen leaves	Nizamabad, Adilabad, Kakinada, Srikakulam, Bhadrachalam, Yellandu, Ashwaraopet of Khammam Dist.	HCIO No. 43027
79.	<i>*Phaeoisaria caffera</i> T. Matsush.	Decaying plant debris, twigs	Karimnagar, Bhadrachalam, Yellandu forests of Khammam Dist.	HCIO No. 43028
80.	<i>Pithomyces chartaum</i> (Berk. and Curt.) Ellis	Plant debris, decaying leaf litter	Bhadrachalam, Yellandu, Ashwaraopet forests of Khammam, Adilabad, Medak Dist.	HCIO No. 43029

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81.	* <i>Ramichloridium musae</i> (Stahel ex Ellis) de Hoog	Decaying leaves, rotting twigs	Papikondalu, Bhimavaram, Bhadrachalam, Ashwaraopet forests of Khammam Dist.	HCIO No. 43015
82.	* <i>Scolecobasidium humicola</i> G.L. Barron & L.V. Busch.	Soil	Vikarabad	OUFH 276
83.	<i>Spegazzinia intermedia</i> Ellis	Leaf litter, decaying bark, twigs	Warangal, Adilabad, Bhadrachalam, Ashwaraopet forests of Khammam Dist.	HCIO No. 43032
84.	* <i>Spegazzinia lobulata</i> Thrower	Fruit	Bhadrachalam	OUFH 772
85.	<i>Sporotrichum pruinosum</i> J.C. Gilman & E.V. Abbott	Field soil (maize)	Hyderabad	OUFH 287
86.	<i>Stachybotrys cylindrospora</i> C.N. Jensen	Soil	Vikarabad	OUFH 291
87.	* <i>Stachybotrys parvispora</i> S. Hughes	Soil (spinach)	Hyderabad	OUFH 292
88.	<i>Stachybotrys pulchra</i> Spegazzini	Leaf litter, decaying bark, twigs	Bhadrachalam, Ashwaraopet, Yellandu of Khammam district	HCIO No.43034
89.	<i>Stachydidium bicolor</i> Link ex S.F. Gray, Link, Mag.	Decaying leaf litter, barks, twigs	Nizamabad, Srikakulam, Bhadrachalam, Ashwaraopet, Yellandu forests of Khammam district	HCIO No. 43036
90.	* <i>Stenella aegles</i> S.S. Prasad	<i>Aegle marmelos</i> Leaf	Eturnagaram	OUFH 218
91.	* <i>Stigmina tubakii</i> N.D. Sharma	<i>Cocos nucifera</i> Leaf	Eturnagaram	OUFH 220
92.	<i>Thielaviopsis paradoxa</i> (De Seynes) Hohn.	<i>Phoenix sylvestris</i> Leaf/ Petiole	Warangal	OUFH 221
93.	<i>Torula herbarum</i> Pers. ex Link	Decaying plant debris	Allover A.P	HCIO No. 43040
94.	<i>Trichoderma koningii</i> Oudem & Koning	Plant debris	Bhadachalam, Yellandu Ashwaraopet of Khammam Dist, Hyderabad, Warangal, Nizamabad, Adilabad	HCIO No. 43042
95.	<i>Trichoderma harzianum</i> Rifai	Litter	Bhadrachalam, Yellandu of Khammam Dist. Hyderabad, Medak	HCIO No. 43043
96.	<i>Trichothecium roseum</i> (Pers.) Link	Pond mud	Vikarabad	OUFH 323
97.	* <i>Tripospermum myrti</i> (Lind.) S. Hughes	<i>Eucalyptus</i> leaf	Bhadrachalam	OUFH 783
98.	<i>Trichurus spiralis</i> Hasselbr.	Soil (spinach)	Narsapur	OUFH 324
99.	<i>Tritirachium</i> sp.	Soil	Hyderabad	OUFH 326
100.	<i>Tritirachium dependens</i> Limber.	Decaying debris	Bhadrachalam, Yellandu, Ashwaraopet	HCIO No. 43045
101.	* <i>Tritirachium roseum</i> J.F.H. Beyma	Soil	Hyderabad	OUFH 327
102.	<i>Trimmatostroma indica</i> Manoharachary, Rao & Rama Rao	Litter	Bhadrachalam, Ashwaraopet, Nalgonda, Nizamabad	HCIO No. 43044
103.	<i>Trimmatostroma indicum</i> Manohar., P. Rag. Rao & P. Rama Rao	Soils (coffee)	Ananthagiri	OUFH 325
104.	<i>Ulocladium gparwalii</i> Nagaraju, Kunwar, Manohar. & Agarwal	Litter	Yellandu	HCIO No 49187
105.	<i>Ulocladium lignicola</i> Nagaraju, Kunwar, Manohar. & Agarwal	Bark	Yellandu	HCIO No 49188
106.	<i>Verticillium theobromae</i> (Durc) Mason. Hughes	Decaying leaves	Warangal, Nizamabad, Bhadrachalam, Yellandu, Ashwaraopet of Khammam	HCIO No. 43046

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The present survey also indicates that Bhadrachalam forest area harboured 24 fungal species followed by Hyderabad region with 22 fungal species, Yellandu forest region with 20 fungal species, Khammam forest localities with 17 fungi, Ashwaraopet forests with 15 species, Adilabad forest localities with 12, Nizamabad with 11 fungal species, Warangal region forest localities with 10 fungal species, Vikarabad forest region localities with 9 fungal species, and all other forest localities showed the incidence of 2-6 fungal species (Fig. 2).

Earlier several researchers have reported some hyphomycetous fungi from Andhra Pradesh and Telangana (Manoharachary and Rama Rao, 1971, 1972, 1973; Manoharachary *et al.*, 1971; Suresh Kumar *et al.*, 2006, 2009; Nagaraju *et al.*, 2009, 2011a, b, 2012). In spite of all such surveys there appears to be a huge potential hidden wealth of fungi available in various forests of Andhra Pradesh and Telangana. Further the present data clearly indicates that out of 105 fungi reported in this paper, as many as 32 form new additions to the fungi of Andhra Pradesh and Telangana as per

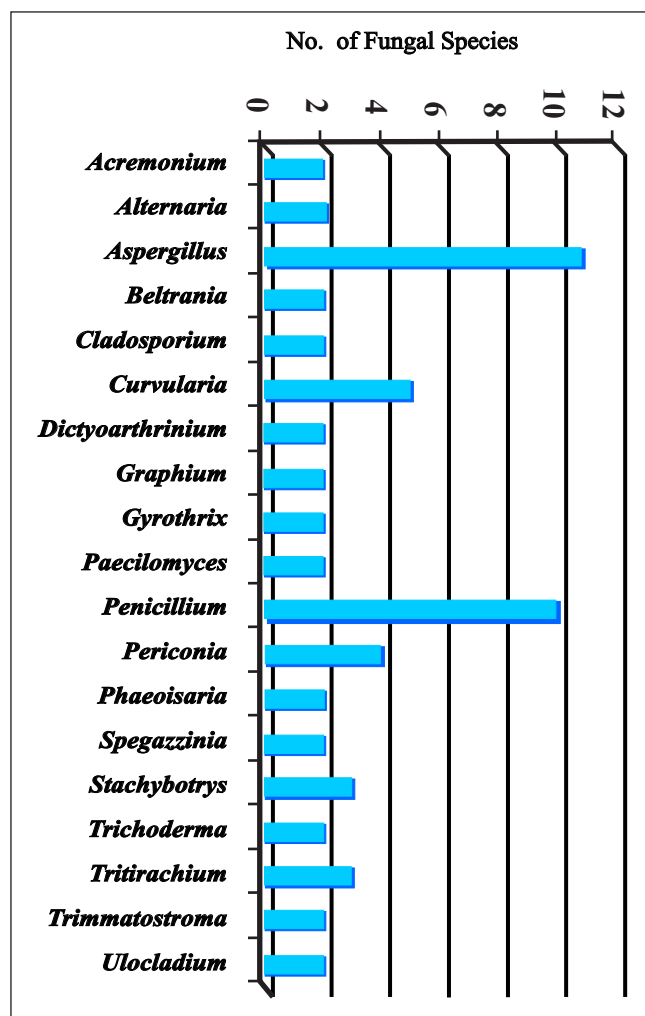


Fig. 1: Number of fungal species of each genus in the study area

the available literature (Butler and Bisby, 1960; Bilgrami *et al.*, 1979, 1981, 1991; Sarbhoy *et al.*, 1996).

CONCLUSION

A survey of hyphomycetous fungi from Andhra Pradesh and Telangana, India (2010-2020) has revealed the presence of 105 fungi of which 32 hyphomycetous fungi form new additions to the fungi of Andhra Pradesh and Telangana. Therefore, it is concluded that there are several macro- and micro-ecological niches supporting a wealth of hyphomycetous fungi occurring in India, which needs in-depth survey, analysis and identification of hyphomycetous fungi. Some of these fungi may be of biotechnological importance in relation to human welfare. Further surveys may yield many new genera, new species and new additions to the fungi of India.

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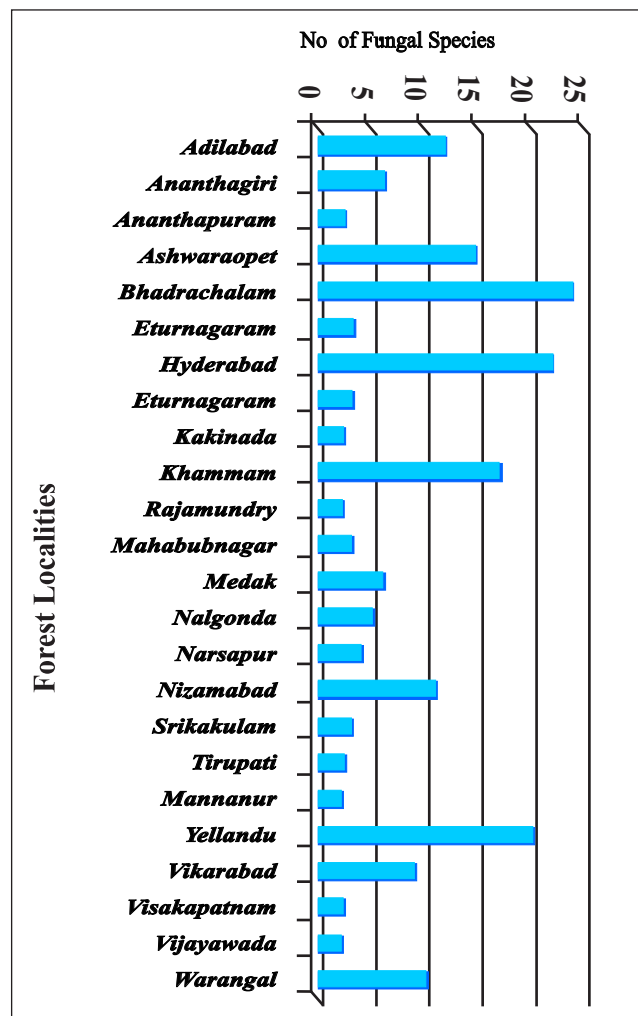


Fig. 2: Number of fungal species associated with different forest localities of Telangana and AP

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REFERENCES

- Agnihotrudu, V. 1962. Notes on fungi from North East India- XI *Hyphomycetes*. *J. Indian. Bot. Soc.* **41**(3): 488-490.
- Arjun Shukla., Sunita Sharma and Shivani Rai 2016. Preliminary study of *Hyphomycetes* of central India. *Indian J. Pharm. Biol. Res.* **4**: 31-33.
- Bilgrami, K.S., Jamaluddin and Rizvi, M.A. 1979. *The Fungi of India Part I* (List and Reference). Today and Tomorrow's Printers and Publishers, New Delhi.
- Bilgrami, K.S., Jamaluddin and Rizvi, M.A. 1981. *The Fungi of India Part II* (Host Index and Addenda). Today and Tomorrow's Printers and Publishers, New Delhi.
- Bilgrami, K.S., Jamaluddin and Rizvi, M.A. 1991. *The Fungi of India Part I* (List and References). Today

- and Tomorrow's Printers and Publishers, New Delhi.
- Bhat, D. J. 2010. *Fascinating Microfungi (Hyphomycetes) of Western Ghats, India*. Broadway Publishers, 222 p.
- Butler, E.J. and Bisby, R. 1960 (revised by Vasudeva, R.S) *The Fungi of India*. ICAR Publ., New Delhi.
- Ellis, M.B. 1971. *Dematiaceous Hyphomycetes*. CMI, Kew, Surrey, England, 608 p.
- Ellis, M.B. 1976. *More Dematiaceous Hyphomycetes*. CMI, Kew, Surrey, England, 507 p.
- Ellis, M.B and Ellis, J.P. 1998. *Microfungi on Miscellaneous Substrates; An Identification Handbook*. The Richmond Publishing Co. Ltd., 246 p.
- Hawksworth, D.L., Kirk, P.M., Sutton, B.C. and Pegler, D.N. 1999. *Dictionary of the Fungi*. CAB Intl. U.K., 616 p.
- Jamaluddin, Goswami, M.G. and Ojha, B.M. 2004. *Fungi of India (1989-2001)*. Scientific Publishers, India.
- Kirk, P.M., Cannon, P.F. and Stalpers, J.A. 2008. *Dictionary of the Fungi* (10th ed.). CABI Publishing, Wallingford, UK.
- Manoharachary, C. and Rama Rao, P. 1971. A new *Annellophorella* on *Zizyphus*. *Curr. Sci.* **40**: 471-472.
- Manoharachary, C., Raghuvveer Rao, P. and Rama Rao, P. 1971. A new *Trimmatostroma* from soil. *Curr. Sci.* **46**(22): 788.
- Manoharachary, C. and Rama Rao, P. 1972. *Stemphyliomma terricola* sp. nov. from pond mud. *Curr. Sci.* **41**: 718-719.
- Manoharachary, C. and Rama Rao, P. 1973. *Thielavia boothi* sp. nov. from pond mud. *Trans. Br. Mycol. Soc.* **61**: 196-198.
- Manoharachary, C., Sridhar, K., Reena Singh., Alok Adholeya., Suryanarayana, T.S., Seema Rawat and Johri, B.N. 2005. Fungal biodiversity: Distribution, conservation and prospecting of fungi from India. *Curr. Sci.* **89**: 58-70.
- Munjal, R.L. and Gill, H.S. 1963. Some dematiaceous *Hyphomycetes* from India II. *Indian Phytopath.* **16**: 62-68.
- Nagamani, A., Kunwar, I.K. and Manoharachary, C. 2006. *Handbook of Soil Fungi*. I.K. International Pvt. Ltd., New Delhi, 477 p.
- Nagaraju, D., Kunwar, I.K., Manoharachary, C. and Agarwal, D.K. 2009. *Ulocladium gpagarwalii* and *U. lignicola* two new sp. nov. from Andhra Pradesh. *Indian Phytopath.* **62** (2): 237-239.
- Nagaraju, D., Kunwar, I.K., Suresh Kumar, G., Manoharachary, C. 2011a. *Custingophora lignicola* sp. nov. and *Chaetopsina indica* sp. nov. from India. *J. Mycol. Pl. Pathol.* **41**(1): 6-10.
- Nagaraju, D., Kunwar, I.K., Sureshkumar, G. and Manoharachary, C. 2011b. A new synnematosus hyphomycetous fungus *Bhadradriella* gen. nov. from India. *J. Mycol. Pl. Pathol.* **41**(2): 238-240.
- Nagaraju, D., Kunwar, I.K., Manoharachary, C. 2012. Mycofloristics of some forest localities in Khammam District, A.P., India. *Nelumbo* **54**: 1-13.
- Prasher, I.B., Manju and Sushma 2016. New records of hyphomycetous fungi from North Western Himalayas, India. *Journal on New Biological Reports* **5**(2): 87-92.
- Sarbhoy, A.K., Agarwal, D.K. and Varshney, J.L. 1996. *Fungi of India (1982-92)*. CBS Publ. Distri., New Delhi, 350 p.
- Subramanian, C.V. 1971. *Hyphomycetes*, ICAR Publ., New Delhi, 930 p.
- Suresh Kumar, G., Sarath Babu, K., Kunwar, I.K. Manoharachary, C. and Prasad, V. 2006. New records of fungi from India. *J. Mycol. Pl. Pathol.* **36** (1): 8-10.
- Suresh Kumar, G., Manoharachary, C. and Kunwar, I.K. 2009. *Bhadradriomyces*, a new dematiaceous hyphomycetous genus from India. *J. Mycol. Pl. Pathol.* **39**(2): 238-240.
- Waksman, S.A. 1916. Do fungi live and produce mycelium in the soil? *Sci NS* **44**: 320-322.
- Wu, B., Muzammil Hussain, Weiwei Zhang, Marc Stadler, Xingzhong Liu and Meichun Xiang 2019. Current insights into fungal species diversity and perspective on naming the environmental DNA sequences of fungi. *Mycology* **10** (3): 127-140; doi: 10.1080/21501203.2019.1614106.