



CHECKLIST OF DEUTEROMYCETOUS FUNGI OF BANGLADESH II

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ABSTRACT

Eighty three species of anamorphic fungi under 20 genera belonging to Moniliaceae, Tuberculariaceae and Stilbelaceae found in Bangladesh from 1952 till date are enlisted. The alphabetical checklist of the genera is provided herewith. Further updates will be added in the subsequent versions of the publication.

Keywords: Checklist, Fungi, Moniliaceae, Tuberculariaceae, Stilbelaceae, Bangladesh

INTRODUCTION

The fungal flora in Bangladesh have not been fully recorded as yet. However, the hot humid climatic conditions of the country are highly congenial for them. As such, a rich fungal biodiversity is evident in the country. Deuteromycota ("Deuteromycetes") or fungi imperfecti are anamorphic fungi, or mitosporic fungi, but these are terms used without taxonomic rank. Anamorphic or conidial fungi are asexually or mitotically sporulating fungi traditionally classified in the Fungi Imperfecti or the form taxon Deuteromycotina, with subsidiary form taxa Hyphomycetes and Coelomycetes (Alexopoulos *et al.* 1996, Kendrick 1981, Taylor 1995 and Anonymous 2017).

Under the former system, a name for an asexually reproducing fungus was considered a *form taxon*. For example, the ubiquitous and industrially important mold, *Aspergillus niger*, has no known sexual cycle. Thus *A. niger* is considered a form taxon. In contrast, isolates of its close relative, *A. nidulans*, revealed to be the anamorphic stage of a teleomorph (the ascocarp or fruiting body of the sexual reproductive stage of a fungus), which was already named *Emericella nidulans*. When such a teleomorphic stage is known, that name will take priority over the name of an anamorph (which lacks a sexual reproductive stage). Hence the formerly classified *Aspergillus nidulans* is now properly called *E. nidulans*. Anamorphs of the Eurotiales,

Trichocomaceae: *Penicillium*, *Aspergillus*, and *Paecilomyces*. Anamorphs of Erysiphales: *Oidium* and its Segregates. Anamorphs of the Hypocreales: *Acremonium*, *Cylindrocarpon*, *Cylindrocladium*, *Fusarium*, *Gliocladium*, *Stachybotrys*, *Trichoderma*, *Verticillium*, and others (Seifert and Gams 2001). Climate of Bangladesh is suitable for growth and reproduction of various mycoflora in nature as parasites or saprophytes. Present paper deals with monilaceous hyphomycetes including genera of Moniliaceae, Tuberculariaceae and Stilbelaceae that are enlisted in Bangladesh from 1952 till date (Ahmed 1952, Wadud and Ahmed 1962, Ishaque and Talukdar 1967, Talukder 1974, Fakir 1987, Miah 1993, Siddiqui *et al.* 2007, Bakr *et al.* 2007, Aktar and Shamsi 2010, Helal *et al.* 2018 and Nahar *et al.* 2019). Classification of fungi were based on Thom and Raper 1945, Raper *et al.* 1949. Booth 1971, Barnett and Hunter 1972 and 1998.

Ellis (1971 and 1976), Ellis and Ellis (1997) and Barnett and Hunter (1972 and 1998) extensively worked on anamorphic fungi and they followed "Saccardean system of classification"

Form Class Deuteromycetes

Form Order Mucorales

Moniliales

Sphaeropsidales

Melanconiales

Mycelia sterilia

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MATERIALS AND METHODS

The present paper deals with substratum range of 83 species of moniliaceous Hyphomycetes reported so far from different habitats of Bangladesh. They were found as pathogens or saprophytes on stem, leaf, woody debris and leaf litter environment. Asexual fruiting structures of these fungi were studied directly from the samples or isolated from the samples. The research was conducted in Bangladesh Jute Research Institute (BJRI), Dhaka, Bangladesh Rice Research Institute (BRRI), Joydebpur, Gazipur, Dhaka, Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur, Dhaka Bangladesh Agricultural University, (BAU), Mymensingh, Dhaka University, Dhaka, Rajshahi University, Rajshahi, Chittagong University, Chittagong, Jahangirnagar University (JU), Savar, Dhaka and Jagannath University (JnU), Dhaka. The checklist of Deuteromycetous fungi recorded from Bangladesh is compiled on the basis of published literatures of the Country. The fungi were isolated from the respective hosts following 'Tissue planting method' (CAB 1968). Seed borne fungi were isolated following 'Blotter method' or 'Paper towel method' (Anonymous 2014). Soil borne fungi were isolated following 'serial dilution method'. Distribution of 83 species of fungi reported so far from various sites of Bangladesh is provided. The most frequently collected species of the genera are *Aspergillus*, *Fusarium*, *Penicillium*, *Oidium* and *Trichoderma*. The checklist includes detail of the substrata on which they encountered as far as possible. This data will be useful in the compilation of fungal biodiversity of Bangladesh.

RESULTS AND DISCUSSION

The Hyphomycetes, like other groups of Deuteromycetes, is an artificial one composed almost entirely of anamorphic fungi of ascomycete affinity. The majority are known anamorphs of Ascomycetes, although some have basidiomycete affinities. Several of the latter are aquatic or aero-aquatic. They lack locular fruit bodies (conidiomata), and so sporulation occurs on separate or aggregated hyphae, which may or may not be differentiated, the thallus consists of septate hyphae. About 1400 genera comprising more than 11,500 species are recognized (Anonymous 2017a and 2017b).

Siddiqui *et al.* (2007) have reported 275 fungal species under 125 genera from Bangladesh. Shamsi (2017a and 2017b) presented check list of forty species of lower fungi and 208 species of anamorphic fungi under 51 genera of the family Dematiaceae from Bangladesh.

Eighty three species of anamorphic fungi under 20 genera belonging to Moniliaceae, Tuberculareaceae and Stilbelaceae found in Bangladesh from 1952 till date are enlisted. One variety of *Fusarium moniliformae*, three varieties of *F. oxysporum* and one variety of *F. udum* are also included in the present account. Fungi are listed in Table 1.

Present document will enrich the list of mycoflora in Bangladesh and subsequently it will be also helpful for studying fungal diversity in the country.

Table 1.
Form-Order Moniliales
Form Family Moniliaceae

SL. No.	Name of fungi	Host/Habitat	Status	References
1.	<i>Aspergillus aculeatus</i> Iizuka	In Soil of rice and wheat field	Occurrence infrequent	Bakr <i>et al.</i> 2007
2.	<i>A. candidus</i> Link	Associated with seeds of <i>Pisum sativum</i> L.	Occurrence infrequent	Bakr <i>et al.</i> 2007
3.	<i>A. clavatus</i> Desm.	On <i>Vigna mungo</i> L. Causing rot	Occurrence infrequent	Bakr <i>et al.</i> 2007
4.	<i>Flavus</i> Link	On seeds	Occurrence frequent	Siddiqui <i>et al.</i> 2007
5.	<i>A. flavipes</i> (Bainier & Sartory) Thom & Church	On seeds of <i>Cicer arietenum</i> L.	Occurrence infrequent	Siddiqui <i>et al.</i> 2007
6.	<i>A. fumigatus</i> Fresenius	On seeds, fruits and Soil	Occurrence frequent	Siddiqui <i>et al.</i> 2007
7.	<i>A. funiculosus</i> Smith	Soil, contaminated food and seeds	Occurrence infrequent	Siddiqui <i>et al.</i> 2007
8.	<i>A. glaucus</i> (L.) Link	Storage seeds of <i>Bombax</i> L.. (shemul cotton)	Occurrence infrequent	Bakr <i>et al.</i> 2007
9.	<i>A. humicola</i> Choudhri and Sachar	On saw dust, compost	Occurrence infrequent	Siddiqui <i>et al.</i> 2007
10.	<i>A. luchuensis</i> Inui	Soil, Storage food and grain	Occurrence infrequent	Siddiqui <i>et al.</i> 2007
11.	<i>A. nidulans</i> (Eidam) Wint.	On <i>oryza sativa</i> L.	Occurrence infrequent	Shamsi <i>et al.</i> 2010
12.	<i>A. niger</i> van Tieghem	On storage seeds of cereals , soil, fruits, bread.	Occurrence frequent	Siddiqui <i>et al.</i> 2007
13.	<i>A. ochraceous</i> Wilhelm	Soil, plant debris and seeds	Occurrence frequent	Siddiqui <i>et al.</i> 2007
14.	<i>A. repens</i> (Corda) Sacc.	Soil and air	Occurrence infrequent	Siddiqui <i>et al.</i> 2007
15.	<i>A. sydowii</i> (Bainier & Sartory) Thom and Church	Isolated from <i>Cucurbita</i> L.. (Cucurbits)	Occurrence infrequent	Bakr <i>et al.</i> 2007
16.	<i>A. terreus</i> Thom	Isolated from soil	Occurrence infrequent	Bakr <i>et al.</i> 2007
17.	<i>A. tamarii</i> Kita	<i>Solanum lycopersicum</i> L.. (<i>Lycopersicon esculentum</i> Mill.) tomato	Occurrence infrequent	Bakr <i>et al.</i> 2007
18.	<i>Beauveria bassiana</i> (Bals.-Criv.) Vuill.	Disease of <i>Bombyx mori</i> L.	Occurrence frequent in Rajshahi district specially in silkworm growing area	Siddiqui <i>et al.</i> 2007
19.	<i>Candida krusei</i> (Castell.) Berkhout,	Isolated from lemon in storage	Occurrence infrequent	Shamsi <i>et al.</i> 2015

Table 1. (contd.)

SL. No.	Name of fungi	Host/Habitat	Status	References
20.	<i>Chlamydomyces</i> Bainier	On leaf and sheath of <i>Araeca catechu</i> L.	Occurrence infrequent	Talukdar 1974
21.	<i>Cylindrocladium</i> Morgan	On leaves of <i>Dalbergia. sissoo</i> Roxb (Sisam).	Rare	Shamsi <i>et al.</i> 2012a
22.	<i>C. crotalariae</i> (Loos) D.K. Bell & Sobers	On <i>Arachis hypogaea</i> L.	Rare	Miah 1993
23.	<i>Dectylaria dimorphospora</i> Veenb.-Rijks	Isolated from <i>Oryza sativa</i> L.	Rare	Shamsi 1999
24.	<i>Gliocladium</i> Corda	Isolated from <i>Arthrospira platensis</i> (Nordstedt) Gomont [<i>Spirulina platensis</i> (Gomont) Geitler]	Biocontrol against <i>R. solani</i>	Bakr <i>et al.</i> 2007
25.	<i>Geotrichum candidum</i> Link	Isolated from <i>Arthrospira platensis</i> (Nordstedt) Gomont [<i>Spirulina platensis</i> (Gomont) Geitler]	Occurrence infrequent	Kibria <i>et al.</i> 2016
26.	<i>Monilia impicata</i> Gilman & Abbott		Occurrence infrequent	Siddiqui <i>et al.</i> 2007
27.	<i>Oidium azadirachtae</i> Narayanas. & Ramakr.	On <i>Azadirachta indica</i> A. Juss.	Occurrence frequent	Bakr <i>et al.</i> 2007
28.	<i>Oidium</i> Link	On cucurbits	Occurrence infrequent	Bakr <i>et al.</i> 2007
29.	<i>O. mangiferae</i> Berthet	On <i>Manigifera indica</i> L.	Causing powdery mildew disease at flowering stage	Shahjahan 1993
30.	<i>O. heveae</i>	On <i>Havea braziliensis</i> L.	Occurrence frequent	Bakr <i>et al.</i> 2007
31.	<i>Oidium lini.</i> Škorič	On old seeds of <i>Glycin max</i> L.	Causing rot of seeds	Bakr <i>et al.</i> 2007
32.	<i>Ovulariopsis sissoo</i> Shamsi, Sultana and Azad sp. nov	On <i>Dalbergia. Sissoo</i> Roxb	Occurrence frequent	Shamsi <i>et al.</i> 2008a
33.	<i>Paceilomyces</i> Bainier	Air borne	Occurrence infrequent	Shamsi <i>et al.</i> 2014
34.	<i>Paecilomyces lilacinus</i> (Thom) Samson	On <i>Triticum aestivum</i> L.	Occurrence frequent	Bakr <i>et al.</i> 2007
35.	<i>Penicillium atramentosum</i> Thom	In Soil of rice and wheat field	Occurrence infrequent	Bakr <i>et al.</i> 2007
36.	<i>P. chrysogenum</i> Thom	In Soil of rice and wheat field	Occurrence infrequent	Bakr <i>et al.</i> 2007

Table 1. (contd.)

SL. No.	Name of fungi	Host/Habitat	Status	References
37.	<i>P. digitatum</i> (Pers.) Sacc.	On Citrus fruits	Occurrence frequent	Bakr <i>et al.</i> 2007
38.	<i>P. expansum</i> Link	Soil of grass land	Occurrence frequent	Bakr <i>et al.</i> 2007
39.	<i>P. frequentans</i> Westling	Isolated from <i>Arthrospira platensis</i> (Nordstedt) Gomont [<i>Spirulina platensis</i> (Gomont) Geitler]	Occurrence infrequent	Kibria <i>et al.</i> 2016
40.	<i>Penicillium funiculosum</i> Thom	Soil of rice and wheat field	Occurrence infrequent	Bakr <i>et al.</i> 2007
41.	<i>P. italicum</i> Wehmer,		Occurrence frequent	Bakr <i>et al.</i> 2007
42.	<i>P. notatum</i> Westling	On <i>Cicer arietinum</i> L.	Occurrence infrequent	Bakr <i>et al.</i> 2007
43.	<i>P. oxalicum</i> Currie & Thom	<i>Zea mays</i> L.	Occurrence infrequent	Bakr <i>et al.</i> 2007
44.	<i>P. pinophilum</i> Hedgc	Isolated from <i>Allium sativum</i> L.	Occurrence infrequent	Bakr <i>et al.</i> 2007
45.	<i>Sarocladium oryzae</i> (Sawada) Gams and Hawksw	Isolated from <i>Oryza sativa</i> L.	Causal agents of sheath rot of rice. Occurrence frequent	Shamsi <i>et al.</i> 2003
46.	<i>Scopulariopsis</i> Bainier.	Isolated from aromatic rice <i>Oryza sativa</i> L.	Occurrence infrequent	Shamsi <i>et al.</i> 2010
47.	<i>Spikeria</i> sp.	Isolated from <i>Atrocurpus altalis</i> Fosb.	Occurrence infrequent	Shamsi <i>et al.</i> 2012b
48.	<i>Trichoderma album</i> Preuss	Soil, cow's rumen.	Occurrence infrequent	Siddiqui <i>et al.</i> 2007
49.	<i>T. glaucum</i> Abbot	Soil	Occurrence infrequent	Siddiqui <i>et al.</i> 2007
50.	<i>T. herzineum</i> Rifai	Soil	Occurrence frequent	Bakr <i>et al.</i> 2007
51.	<i>T. lignorum</i> (Tode) Hughes	Soil	Occurrence infrequent	Siddiqui <i>et al.</i> 2007
52.	<i>T. koningii</i> Oudem.	Soil	Occurrence infrequent	Bakr <i>et al.</i> 2007
53.	<i>T. viride</i> Pers. Ex Fries.	Soil	Occurrence frequent	Bakr <i>et al.</i> 2007

Table 1. (contd.)

SL. No.	Name of fungi	Host/Habitat	Status	References
54.	<i>Trichothecium roseum</i> Link.	Isolated from infected dried fruit surface of jute.	Also Isolated from the infected dried pod surface of BARI Chola-3 (<i>Cicer arietinum</i> L.)	Shamsi and Sultana 2008b
Family Tuberculariaceae				
55.	<i>Fusarium avenaceum</i> (Fr.) Sacc.	On <i>Arachis hypogaea</i> L.	Occurrence infrequent	Shamsi and Sharmin 2012c
56.	<i>Fusarium buharicum</i> Jaczewski	On <i>Arachis hypogaea</i> L.	Occurrence infrequent	Shamsi and Sharmin 2012c
57.	<i>F. caeruleum</i> Lib. ex Sacc.	On <i>Solanum tuberosum</i> L. potato	Dry rot major	Bakr <i>et al.</i> 2007
58.	<i>F. culmorum</i> (Wm.G.Sm.) Sacc.	On <i>Triticum aestivum</i> L.	Occurrence infrequent	Bakr <i>et al.</i> 2007
59.	<i>F. equiseti</i> (Corda) Sacc.	On <i>Arachis hypogaea</i> L.	Occurrence infrequent	Shamsi and Sharmin 2012c
60.	<i>F. fujikuroi</i> Nirenberg	Isolated from <i>Oryza sativa</i> L.	Occurrence frequent causing bakanae disease of rice	Miah 1993
61.	<i>F. flocciferum</i> Corda	On <i>Caryca papaya</i> L.	Occurrence infrequent	Helal <i>et al.</i> 2018
62.	<i>F. graminearum</i>	On <i>Chorcorus capsularis</i> L.	Occurrence frequent	Bakr <i>et al.</i> 2007
63.	<i>F. heterosporum</i> Nees ex Fr.	On <i>Arachis hypogaea</i> L.	Occurrence infrequent	Shamsi and Sharmin 2012b
64.	<i>F. merismoides</i> Corda	On <i>Sesamum indicum</i> L.	Rare	Shamsi and Hosen 2016
65.	<i>F. moniliforme</i> Sheldon	On soil, rice grains and fruits	Occurrence frequent	Siddiqui <i>et al.</i> 2007
a.	<i>F. moniliforme</i> var. <i>subgluitans</i> Wr. & Reink	Isolated from <i>Zia mayze</i> L.	Occurrence infrequent	Yasmin 2007
66.	<i>F. nivale</i> (Fr.) Ces. Rabenh.	On <i>Datura metel</i> L.	Occurrence infrequent	Aktar and Shamsi 2010
67.	<i>F. orthoceros</i> Appel. & Woll.	On <i>Cicer arietinum</i> L.	Major disease	Bakr <i>et al.</i> 2007

Table 1. (contd.)

SL. No.	Name of fungi	Host/Habitat	Status	References
68.	<i>F. oxysporum</i> Schlecht	On <i>Musa</i> spp.	Occurrence frequent	Talukdar 1974
a.	<i>F. oxysporum</i> f. sp. <i>cubens</i> (Smith) Snyder & Hanson	On <i>Musa</i> spp.	Panama disease Major 80	Talukdar 1974
b.	<i>F. oxysporum</i> f. sp. <i>Lini</i> (Bolley) Snyder & Hansen	On <i>Linum usitatissimum</i> L.	causing minor wilt disease	Talukdar 1974
c.	<i>F. oxysporum</i> f. sp. <i>vasinfectum</i> (G.F. Atk.) W.C. Snyder & H.N. Hansen	On <i>Gossypium hirsutum</i> L.	Causing cotton wilt	Talukdar 1974
69.	<i>Fusarium pllidoroseum</i> (Cook) Sacc.	On <i>Oryza sativa</i> L.	Occurrence infrequent	Shamsi 1999
70.	<i>F. poae</i> (Peck) WollenWeber	On <i>Allium sativum</i> L.	Occurrence infrequent	Bakr <i>et al.</i> 2007
71.	<i>F. proliferatum</i> (Matsush.) Nirenberg ex Gerlach & Nirenberg,	On <i>Oryza sativa</i> L.	Occurrence infrequent	Sultana <i>et al.</i> , 2018
72.	<i>F. semitectum</i> , Berk. & Rav.	On <i>Arachis hypogaea</i> L.	Occurrence infrequent	Shamsi and Sharmin 2012c
73.	<i>F. solani</i> (Mart.) Sacc.	Soil, infected plants and animals	Occurrence frequent	Siddiqui <i>et al.</i> 2007
74.	<i>Fusarium sporotrichioides</i> Sherb, Mem	Isolated from seeds of <i>Gossypium arboreum</i> L	Occurrence infrequent	Nahar <i>et al.</i> 2019
75.	<i>F. trichothecioides</i> Wollenw	Isolated from <i>Arthrospira platensis</i> (Nordstedt) Gomont [<i>Spirulina platensis</i> (Gomont) Geitler]	Occurrence infrequent	Kibria <i>et al.</i> 2016
76.	<i>F. tumidum</i> Sherb.	On cereal grain	Occurrence infrequent	Bakr <i>et al.</i> 2007
77.	<i>F. udum</i> Butler	On <i>Cajanus cajan</i> L.	Major disease	Talukdar 1974
78.	<i>F. udum</i> var. <i>crotalariae</i> (Kol) Pad.	On <i>Crotalaria juncea</i>	Major disease	Talukdar 1974
79.	<i>Fusarium vasinfectum</i> Atk.	Causing cotton wilt	Occurrence infrequent	Talukdar 1974
80.	<i>Microdochium oryzae</i> (Hashioka & Yokogi) Samuels & Hallett,	On <i>Oryza sativa</i> L.	Occurrence infrequent	Bakr <i>et al.</i> 2007
81.	<i>M. fisheri</i>	On <i>Oryza sativa</i> L.	Occurrence infrequent	Sultana <i>et al.</i> 2018
82.	<i>Rhynchosporium oryzae</i> Hashioka & Yokogi,	On <i>Oryza sativa</i> L.	Cusing leaf scold disease of rice	Bakr <i>et al.</i> 2007
Family Stilbaceae				
83.	<i>Isariopsis</i> Fres.	On <i>Zizypus jujube</i>	Causing minor leaf spot	Talukdar 1974

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(Received revised manuscript on 30 June 2019)