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Research Article

Studies of *Diaporthe* (Diaporthaceae, Diaporthales) species associated with plant cankers in Beijing, China, with three new species described

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Abstract

The genus *Diaporthe* (Diaporthaceae, Diaporthales) comprises endophytes, pathogens and saprophytes, inhabiting a wide range of woody hosts and resulting in serious canker disease. To determine the diversity of *Diaporthe* species associated with canker disease of host plants in Beijing, China, a total of 35 representative strains were isolated from 18 host genera. Three novel species (*D. changpingensis*, *D. diospyrina* and *D. ulmina*) and four known species (*D. corylicola*, *D. donglingensis*, *D. eres* and *D. rostrata*) were identified, based on morphological comparison and phylogenetic analyses using partial ITS, *cal*, *his3*, *tef1-α* and *tub2* loci. These results provide an understanding of the taxonomy of *Diaporthe* species associated with canker diseases in Beijing, China.

Key words: Canker disease, Diaporthales, phylogeny, plant disease, taxonomy

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Introduction

Diaporthe (Diaporthales, Sordariomycetes) was established by Fuckel (1867) with *D. alnea* as the type species. Members of *Diaporthe* are distributed worldwide on the leaves, branches, fruits or seeds of broad hosts and often regarded as endophytes, pathogens and saprobes (Maharachchikumbura et al. 2015, 2016; Huang et al. 2021; Yang et al. 2021; Cao et al. 2022). Several species in *Diaporthe* have been reported as pathogens causing severe canker diseases on economically and ecologically important plants (e.g. *Castanea*, *Citrus*, *Juglans*, *Pyrus* and *Vaccinium*) (Udayanga et al. 2014; Fan et al. 2015; Guo et al. 2020; Hilário et al. 2020; Jiang et al. 2021a). Currently, more than 1190 species epithets of *Diaporthe* have been listed in Index Fungorum (www.indexfungorum.org; accessed on 23 Mar 2023).

The sexual morph of *Diaporthe* generally has immersed ascomata and erumpent pseudostroma with elongated perithecial necks. Asci are unitunicate and sessile producing hyaline ascospores (Udayanga et al. 2011). The asexual morph of *Diaporthe* can be identified by ostiolate conidiomata, cylindrical phialides and three types (alpha, beta and gamma) of conidia. All of the three types of conidia are aseptate and hyaline, but alpha conidia are fusiform, usually biguttulate; beta conidia are filiform, straight or more often hamate, lack guttules;

gamma conidia are fusiform to subcylindrical, multiguttulate (Udayanga et al. 2011; Gomes et al. 2013).

In the past, species identification criteria in *Diaporthe* was largely based on host specificity and morphological features (Rehner and Uecker 1994; Santos et al. 2010; Dissanayake et al. 2020; Jiang et al. 2021b). However, many *Diaporthe* species have no obvious selectivity for hosts, for example, *D. eres* can infect more than 280 hosts (https://nt.ars-grin.gov/fungaldatabases; accessed on 23 Mar 2023). Additionally, although morphological characteristics were proved to be related to the DNA sequence of most *Diaporthe* species (Guo et al. 2020), many of them with similar morphology are still genetically distinct (Fan et al. 2018a; Jiang et al. 2021a, b). Therefore, it is unreliable for accurate identification when host specificity and morphological features were used alone (Udayanga et al. 2011, 2014; Gomes et al. 2013; Yang et al. 2018). Currently, molecular characteristics were proved to be relied on more heavily than morphology (Castlebury et al. 2003; Crous and Groenewald 2005; Udayanga et al. 2012). The taxonomy of *Diaporthe* species is resolved, based on polyphasic taxonomic concepts including multi-gene phylogenetic and morphological analyses (Udayanga et al. 2012; Fan et al. 2015; Guo et al. 2020; Gao et al. 2021; Jiang et al. 2021a). Five gene regions are used in phylogenetic analyses, including nuclear ribosomal internal transcribed spacer (ITS), calmodulin (*cal*), histone H3 (*his3*), translation elongation factor 1-α (*tef1-α*) and β-tubulin (*tub2*) (Dissanayake et al. 2020; Guo et al. 2020; Gao et al. 2021). The identification of *Diaporthe* species has significantly improved since the polyphasic taxonomic concept was applied, for example, 19 *Diaporthe* species were identified as pathogens associated with pear shoot canker, based on the five loci sequence data coupled with morphology (Guo et al. 2020). Additionally, some issues about species boundaries of the species complex in *Diaporthe* were also well resolved, such as the *D. eres* species complex being investigated and identified as a single species (Hilário et al. 2021; Norphanphoun et al. 2022).

Beijing is the capital city in China and is located in the northern part of the north China Plain. It has a temperate semi-humid monsoon climate, with more than 1,000 species of tree hosts (Ma et al. 1995; Liu et al. 2022). The pathogenic fungi of stem diseases in Beijing are diverse, especially *Diaporthe*. *Diaporthe eres* have been identified from *Castanea Mollissima* and an additional five hosts (Yang et al. 2018); two *Diaporthe* species were commonly isolated from *Juglans mandshurica* (Zhu et al. 2019); *Diaporthe donglingensis*, *D. eres* and *D. huairouensis* were confirmed as pathogens of *Corylus heterophylla* (Bai et al. 2022). During the investigation of plant pathogens in Beijing, branches with typical canker symptoms were collected and subsequently identified combining modern taxonomic concepts. The present study aims to reveal the taxonomy and systematics of *Diaporthe* species with detailed descriptions of novel species.

Materials and methods

Collection, examination and isolation

Fresh specimens with typical ascomata/conidiomata were collected in the surveys of landscape plant canker in Beijing, China. Morphological features of the ascomata/conidiomata were determined by sectioning more than 30 fruiting

bodies by hand vertically and horizontally under a stereomicroscope (M205 FA Leica). Over 50 asci/conidia were randomly selected to capture the micromorphological characteristics by using the compound microscope (DM2500 Leica) with differential interference contrast (DIC) optics. Isolates were obtained by cutting the mucoid asci/conidial mass with a sterile blade from the fruiting bodies to the surface of 1.8% potato dextrose agar (PDA) in a 9 cm Petri dish. Isolates were incubated at 25 °C until spores germinated. Hyphal tips were transferred to new PDA plates. The colour of the colony was assessed according to Rayner (1970). Axenic cultures were deposited in the China Forestry Culture Collection Centre (**CFCC**) and specimens were deposited in the Museum of Beijing Forestry University (**BJFC**).

DNA extraction and PCR amplification

The cetyltrimethylammonium bromide (CTAB) method was used to extract the genomic DNA when enough mycelium of each isolate had grown on PDA for about five days (Doyle and Doyle 1990). PCR amplifications of five genes (ITS, *cal*, *his3*, *tef1-α* and *tub2*) were done by the primer pairs and PCR conditions listed in Table 1. The five partial loci have the same PCR mixtures including 10 µl Mix (Promega), 7 µl double deionised water, 1 µl of each primer and 1 µl template DNA. All of the amplified DNA were sequenced by the Qingke Biotechnology (Beijing, China). SeqMan v. 7.1.0 was used to check and assemble sequences for each of the gene sequences. The sequence data have been deposited in GenBank and their accession numbers have been listed in Table 2.

Phylogenetic analyses

The sequences used in this study were aligned using MAFFT v. 6 (Katoh and Standley 2013) and corrected manually using MEGA v. 6.0 (Tamura et al. 2013). Reference sequences were obtained from the National Center for Biotechnology Information (NCBI), based on recent published literature associated with *Diaporthe* (Gao et al. 2021; Bai et al. 2022; Norphanphoun et al. 2022). The sequences of *Diaporthella corylina* (CBS 121124) were included as outgroups in the polygenic *Diaporthe* analyses. The alignment, based on combined five concatenated sequences, were concatenated and aligned to compare with other species in *Diaporthe* to infer the phylogenetic position using Maximum Likelihood (ML) and Bayesian Inference (BI) analyses.

Table 1. Genes used in this study with PCR primers, primer DNA sequence, optimal annealing temperature.

Locus	PCR primers	PCR: thermal cycles: (Annealing temp. in bold)	Reference
ITS	ITS1/ITS4	(95 °C: 30 s, **48 °C**: 30 s, 72 °C: 1 min) × 35 cycles	White et al. (1990)
cal	CAL228F/CAL737R	(95 °C: 15 s, **54 °C**: 20 s, 72 °C: 1 min) × 35 cycles	Carbone and Kohn (1999)
his3	CYLH3F/H3-1b	(95 °C: 30 s, **57 °C**: 30 s, 72 °C: 1 min) × 35 cycles	Crous et al. (2004) Glass and Donaldson (1995)
tef1-α	EF1-728F/EF1-986R	(95 °C: 15 s, **54 °C**: 20 s, 72 °C: 1 min) × 35 cycles	Carbone and Kohn (1999)
tub2	T1(Bt2a)/Bt2b	(95 °C: 30 s, **55 °C**: 30 s, 72 °C: 1 min) × 35 cycles	Glass and Donaldson (1995) O'Donnell and Cigelnik (1997)

Table 2. Isolates of *Diaporthe* used in the molecular analyses in this study.

Species	Strain	Host	Origin	GenBank accession numbers				
				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe absenteum	LC 3924^{T}	*Camellia sinensis*	China	KP267897	NA	KP293547	KP267971	KP293477
Diaporthe acaciigena	CBS 129521^{T}	*Acacia retinodes*	Australia	KC343005	KC343247	KC343489	KC343731	KC343973
Diaporthe acericola	MFLUCC 17-0956^{T}	*Acer negundo*	Italy	KY964224	KY964137	NA	KY964180	KY964074
Diaporthe acerigena	CFCC 52554^{T}	*Acer tataricum*	China	MH121489	MH121413	MH121449	MH121531	NA
	CFCC 52555	*Acer tataricum*	China	MH121490	MH121414	MH121450	MH121532	NA
Diaporthe acerina	CBS 137.27	*Acer negundo*	NA	KC343006	KC343248	KC343490	KC343732	KC343974
Diaporthe actinidiae	ICMP 13683^{T}	*Actinidia deliciosa*	New Zealand	KC145886	NA	NA	KC145941	NA
Diaporthe acuta	PSCG 047^{T}	*Pyrus pyrifolia*	China	MK626957	MK691125	MK726161	MK654802	MK691225
Diaporthe acutispora	LC6161^{T}	*Coffea* sp.	China	KX986764	KX999274	KX999235	KX999155	KX999195
Diaporthe alangii	CFCC 52556^{T}	*Alangium kurzii*	China	MH121491	MH121415	MH121451	MH121533	MH121573
	CFCC 52557	*Alangium kurzii*	China	MH121492	MH121416	MH121452	MH121534	MH121574
Diaporthe albosinensis	CFCC 53066	*Betula albosinensis*	China	MK432659	MK442979	MK443004	MK578133	MK578059
	CFCC 53067	*Betula albosinensis*	China	MK432660	MK442980	MK443005	MK578134	MK578060
Diaporthe alleghaniensis	CBS 495.72^{T}	*Betula alleghaniensis*	Canada	MH121502	MH121426	MH121462	MH121544	MH121584
Diaporthe alnea	CBS 146.46^{T}	*Alnus* sp.	Netherlands	KC343008	KC343250	KC343492	KC343734	KC343976
Diaporthe amaranthophila	MAFF 246900	*Amaranthus tricolor*	Japan	LC459575	LC459583	LC459581	LC459577	LC459579
Diaporthe ambigua	CBS 114015	*Pyrus communis*	South Africa	KC343010	KC343252	KC343494	KC343736	KC343978
Diaporthe ampelina	STE-U 2660	*Vitis vinifera*	France	NA	AY745026	NA	AY745056	NA
Diaporthe amygdali	CBS 126679^{T}	*Prunus dulcis*	Portugal	MH864208	KC343264	KC343506	KC343748	KC343990
Diaporthe anacardii	CBS 720.97^{T}	*Anacardium occidentale*	East Africa	KC343024	KC343266	KC343508	KC343750	KC343992
Diaporthe angelicae	CBS 111592^{T}	*Heracleum sphondylium*	Austria	KC343027	KC343269	KC343511	KC343753	KC343995
Diaporthe anhuiensis	CNUCC 201901^{T}	*Cunninghamia lanceolata*	China	MN219718	MN224549	MN224556	MN224668	MN227008
Diaporthe apiculatum	CFCC 53068	*Rhus chinensis*	China	MK432651	MK442973	MK442998	MK578127	MK578054
	CFCC 53069	*Rhus chinensis*	China	MK432652	MK44297	MK442999	MK578128	MK578055
Diaporthe aquatica	IFRDCC 3051^{T}	*Aquatic habitat*	China	JQ797437	NA	NA	NA	NA
Diaporthe araucanorum	CBS 145285^{T}	*Araucaria araucana*	Chile	MN509711	MN974277	NA	MN509733	MN509722
	CBS 145286	*Araucaria araucana*	Chile	MN509712	NA	NA	MN509734	MN509723
Diaporthe arctii	DP0482^{T}	*Arctium lappa*	Austria	KJ590736	KJ612133	KJ659218	KJ590776	KJ610891
Diaporthe arecae	CBS 161.64^{T}	*Areca catechu*	India	KC343032	KC343274	KC343516	KC343758	KC344000
Diaporthe arengae	CBS 114979^{T}	*Arenga engleri*	Hong Kong	MF773664	KC343276	KC343518	KC343760	KC344002
Diaporthe arezzoensis	MFLU 19-2883	*Cytisus* sp.	Italy	MT185503	NA	NA	NA	NA
Diaporthe aseana	MFLUCC 12-0299a	Unknown	Thailand	KT459414	KT459464	NA	KT459448	KT459432
Diaporthe asheicola	CBS 136967	*Vaccinium ashei*	Chile	KJ160562	KJ160542	NA	KJ160594	KJ160518
Diaporthe aspalathi	CBS 117169^{T}	*Aspalathus linearis*	South Africa	KC343036	KC343278	KC343520	KC343762	KC344004
Diaporthe australafricana	CBS 111886^{T}	*Vitis vinifera*	Australia	KC343038	KC343280	KC343522	KC343764	KC344006
Diaporthe australiana	BRIP 66145^{T}	*Macadamia* sp.	Australia	MN708222	NA	NA	MN696522	MN696530
Diaporthe baccae	CBS 136972^{T}	*Vaccinium corymbosum*	Italy	MK370623	MG281695	MF418264	KJ160597	MF418509
Diaporthe batatas	CBS 122.21^{T}	*Ipomoea batatas*	USA	KC343040	KC343282	KC343524	KC343766	KC344008
Diaporthe bauhiniae	CFCC 53071	*Bauhinia purpurea*	China	MK432648	MK442970	MK442995	MK578124	MK578051
Diaporthe bauhiniae	CFCC 53072	*Bauhinia purpurea*	China	MK432649	MK442971	MK442996	MK578125	MK578052
Diaporthe bauhiniae	CFCC 53073	*Bauhinia purpurea*	China	MK432650	MK442972	MK442997	MK578126	MK578053

Species	Strain	Host	Origin	GenBank accession numbers				
				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe beilharziae	BRIP 54792^{T}	*Indigofera australis*	Australia	JX862529	NA	NA	JX862535	KF170921
Diaporthe benedicti	SBen914	*Diaporthe benedicti*	USA	KM669929	KM669862	NA	KM669785	NA
Diaporthe betulae	CFCC 50469	*Betula platyphylla*	China	KT732950	KT732997	KT732999	KT733016	KT733020
	CFCC 50470	*Betula platyphylla*	China	KT732951	KT732998	KT733000	KT733017	KT733021
Diaporthe betulicola	CFCC 51128^{T}	*Betula albosinensis*	China	KX024653	KX024659	KX024661	KX024655	KX024657
	CFCC 51129	*Betula albosinensis*	China	KX0246554	KX024660	KX024662	KX0246556	KX024658
Diaporthe betulina	CFCC 52560	*Betula albosinensis*	China	MH121495	MH121419	MH121455	MH121537	MH121577
	CFCC 52561	*Betula albosinensis*	China	MH121496	MH121420	MH121456	MH121538	MH121578
Diaporthe bicincta	CBS 121004^{T}	*Juglans* sp.	USA	KC343134	KC343376	KC343618	KC343860	KC344102
Diaporthe biconispora	ZJUD62	*Citrus maxima*	China	KJ490597	NA	KJ490539	KJ490476	KJ490418
Diaporthe biguttulata	ZJUD47	*Citrus limon*	China	KJ490582	NA	KJ490524	KJ490461	KJ490403
Diaporthe biguttusis	CGMCC 3.17081	*Lithocarpus glabra*	China	KF576282	NA	NA	KF576257	KF576306
Diaporthe bohemiae	CBS 143347^{T}	*Vitis vinifera*	Czech Republic	MK300012	MG281710	MG281361	MG281536	MG281188
Diaporthe brasiliensis	CBS 133183^{T}	*Aspidosperma tomentosum*	Brazil	KC343042	KC343284	KC343526	KC343768	KC344010
Diaporthe caatingaensis	URM7485	*Tacinga inamoena*	Brazil	KY085927	KY115598	NA	KY115604	KY115601
Diaporthe camelliae-oleiferae	HNZZ027^{T}	*Camellia oleifera*	China	MZ509555	MZ504685	MZ504696	MZ504707	MZ504718
Diaporthe camelliae-sinensis	SAUCC194.92	*Camellia sinensis*	China	MT822620	MT855699	MT855588	MT855932	MT855817
Diaporthe camporesii	JZB320143	*Urtica dioidca*	Italy	MN533805	NA	NA	MN984254	MN561316
Diaporthe camptothecicola	CFCC 51632	*Camptotheca acuminata*	China	KY203726	KY228877	KY228881	KY228887	KY228893
Diaporthe canthii	CPC 19740	*Canthium inerme*	South Africa	JX069864	NA	NA	NA	NA
Diaporthe caryae	CFCC 52563	*Carya illinoinensis*	China	MH121498	MH121422	MH121458	MH121540	MH121580
	CFCC 52564	*Carya illinoinensis*	China	MH121499	MH121423	MH121459	MH121541	MH121581
Diaporthe cassines	CPC 21916	*Cassine peragua*	South Africa	KF777155	NA	NA	KF777244	NA
Diaporthe caulivora	CBS 127268	*Glycine max*	Croatia	MH864501	KC343287	KC343529	KC343771	KC344013
Diaporthe celastrina	CBS 139.27^{T}	*Celastrus* sp.	USA	KC343047	KC343289	KC343531	KC343773	KC344015
Diaporthe celeris	CBS 143349^{T}	*Vitis vinifera*	United Kingdom	MG281017	MG281712	MG281363	MG281538	MG281190
Diaporthe cercidis	CFCC 52565^{T}	*Cercis chinensis*	China	MH121500	MH121424	MH121460	NA	MH121582
Diaporthe cercidis	CFCC 52566	*Cercis chinensis*	China	MH121501	MH121425	MH121461	NA	MH121583
Diaporthe chamaeropis	CBS 454.81	*Chamaerops humilis*	Greece	KC343048	KC343290	KC343532	KC343774	KC344016
Diaporthe changpingensis	**CFCC 58812^{T}**	***Robinia pseudoacacia***	**China**	**OQ912925**	**OQ910202**	**OQ910234**	**OQ910264**	**OQ910292**
	CFCC 58813	***Robinia pseudoacacia***	**China**	**OQ912926**	**OQ910203**	**OQ910235**	**OQ910265**	**OQ910293**
Diaporthe charlesworthii	BRIP 54884m^{T}	*Rapistrum rugostrum*	Australia	KJ197288	NA	NA	KJ197250	KJ197268
Diaporthe chensiensis	CFCC 52567^{T}	*Abies chensiensis*	China	MH121502	MH121426	MH121462	MH121544	MH121584
	CFCC 52568	*Abies chensiensis*	China	MH121503	MH121427	MH121463	MH121545	MH121585
Diaporthe chongqingensis	PSCG 435^{T}	*Pyrus pyrifolia*	China	MK626916	MK691209	MK726257	MK654866	MK691321
Diaporthe chromolaenae	MFLUCC 17-1422^{T}	*Chromolaena odorata*	Thailand	MT214456	NA	NA	NA	NA
Diaporthe cichorii	MFLUCC 17-1023^{T}	*Cichorium intybus*	Italy	KY964220	KY964133	NA	KY964176	KY964104
Diaporthe cinnamomi	CFCC 52569^{T}	*Cinnamomum* sp.	China	MH121504	NA	MH121464	MH121546	MH121586
	CFCC 52570	*Cinnamomum* sp.	China	MH121505	NA	MH121465	MH121547	MH121587
Diaporthe cissampeli	CPC 27302^{T}	*Cissampelos capensis*	South Africa	KX228273	NA	KX228366	NA	KX228384
Diaporthe citri	AR3405	*Citrus* sp.	USA	KC843311	KC843157	KJ420881	KC843071	KC843187
	CFCC 53079	*Citrus sinensis*	China	MK573940	MK574579	MK574595	MK574615	MK574635

Species	Strain	Host	Origin	GenBank accession numbers				
				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe citriasiana	CGMCC 3.15224	*Citrus unshiu*	China	JQ954645	KC357491	KC490515	JQ954663	KC357459
Diaporthe citrichinensis	CGMCC 3.15225	*Citrus* sp.	China	JQ954648	KC357494	NA	JQ954666	NA
Diaporthe collariana	MFLU 17-2770^{T}	*Magnolia champaca*	Thailand	MG806115	MG783042	NA	MG783040	MG783041
Diaporthe compactum	LC3083^{T}	*Camellia sinensis*	China	KP267854	NA	KP293508	KP267928	NA
Diaporthe conica	CFCC 52571^{T}	*Alangium chinense*	China	MH121506	MH121428	MH121466	MH121548	MH121588
	CFCC 52572	*Alangium chinense*	China	MH121507	MH121429	MH121467	MH121549	MH121589
Diaporthe constrictospora	GZCC 19-0065	Unknown	China	MT385947	MT424718	MW022487	MT424682	MT424702
	GZCC 19-0084^{T}	Unknown	China	MT385948	MT424719	MW022487	MT424683	MT424703
Diaporthe convolvuli	CBS 124654^{T}	*Convolvulus arvensis*	Turkey	KC343054	KC343296	KC343538	KC343780	KC344022
Diaporthe coryli	CFCC 53083^{T}	*Corylus mandshurica*	China	MK432661	MK442981	MK443006	MK578135	MK578061
	CFCC 53084	*Corylus mandshurica*	China	MK432662	MK442982	MK443007	MK538176	MK578062
Diaporthe corylicola	CFCC 53986^{T}	*Corylus heterophylla*	China	MW839880	MW836684	MW836717	MW815894	MW883977
	CFCC 54696	*Corylus heterophylla*	China	MW839867	MW836685	MW836718	MW815895	MW883978
	CFCC 54697	*Corylus heterophylla*	China	MW839882	MW836698	MW836731	MW815908	MW883991
Diaporthe corylicola	**CFCC 58824**	***Corylus heterophylla***	**China**	**OQ912927**	**OQ910203**	**NA**	**OQ910266**	**OQ910294**
	CFCC 58825	***Corylus heterophylla***	**China**	**OQ912928**	**OQ910204**	**NA**	**OQ910267**	**OQ910285**
Diaporthe crataegi	CBS 114435	*Crataegus rhipidophylla*	Sweden	KC343055	KC343297	KC343539	KC343781	KC344023
Diaporthe crotalariae	CBS 162.33^{T}	*Crotalaria spectabilis*	USA	MH855395	JX197439	KC343540	GQ250307	KC344024
Diaporthe crousii	CAA 823	*Vaccinium corymbosum*	Portugal	MK792311	MK883835	MK871450	MK828081	MK837932
Diaporthe cucurbitae	DAOM 42078^{T}	*Cucumis* sp.	Canada	KM453210	NA	KM453212	KM453211	KP118848
Diaporthe cuppatea	CBS 117499^{T}	*Aspalathus linearis*	South Africa	MH863021	KC343299	KC343541	KC343783	KC344025
Diaporthe cynaroidis	CBS 122676^{T}	*Protea cynaroides*	South Africa	KC343058	KC343300	KC343542	KC343784	KC344026
Diaporthe cytosporella	FAU461	*Citrus limon*	Italy	KC843307	KC843141	NA	KC843116	KC843221
Diaporthe delonicis	MFLU 16-1059	*Ipomoea batatas*	China	KP990621	NA	KP990641	KP990651	KP990631
Diaporthe destruens	ZJUPD06	*Macadamia* sp.	South Africa	MN708229	NA	NA	MN696526	MN696537
Diaporthe diospyricola	CPC 21169^{T}	*Diospyros whyteana*	South Africa	KF777209	NA	NA	NA	NA
Diaporthe discoidispora	ZJUD89	*Citrus unshiu*	China	KJ490624	NA	KJ490566	KJ490503	KJ490445
Diaporthe diospyrina	**CFCC 58820^{T}**	***Diospyros kaki***	**China**	**OQ912929**	**OQ910206**	**OQ910236**	**OQ910268**	**OQ910296**
	CFCC 58821	***Diospyros kaki***	**China**	**OQ912930**	**OQ910207**	**OQ910237**	**OQ910269**	**OQ910297**
Diaporthe donglingensis	CFCC 56581^{T}	*Corylus heterophylla*	China	OM956090	NA	ON157951	ON157986	ON158021
	CFCC 57432	*Corylus heterophylla*	China	OM956091	NA	ON157952	ON157987	ON158022
Diaporthe donglingensis	**CFCC 58806**	***Corylus heterophylla***	**China**	**OQ912931**	**NA**	**OQ910238**	**OQ910270**	**OQ910298**
	CFCC 58807	***Corylus heterophylla***	**China**	**OQ912932**	**NA**	**OQ910239**	**OQ910271**	**OQ910299**
Diaporthe dorycnii	MFLUCC 17-1015^{T}	*Dorycnium hirsutum*	Italy	KY964215	NA	NA	KY964171	KY964099
Diaporthe drenthii	BRIP 66524^{T}	*Macadamia* sp.	Australia	MN708229	NA	NA	MN696526	MN696537
Diaporthe elaeagni-glabrae	LC4802	*Elaeagnus glabra*	China	KX986779	KX999281	KX999251	KX999171	KX999212
Diaporthe ellipicola	CGMCC 3.17084^{T}	*Lithocarpus glaber*	China	KF576270	NA	NA	KF576245	KF576294
Diaporthe ellipsospora	GZCC 19-0231^{T}	decaying woody	Guizhou, China	MT385949	MT424720	MW022488	MT424684	MT424704
Diaporthe endophytica	CBS 133811^{T}	*Schinus terebinthifolius*	Brazil	KC343065	KC343307	KC343549	KC343791	KC344033
Diaporthe eres	AR5193^{T}	*Ulmus* sp.	Germany	KJ210529	KJ434999	KJ420850	KJ210550	KJ420799
	CFCC 52575	*Castanea mollissima*	China	MH121510	NA	MH121470	MH121552	MH121592
	CFCC 52576	*Castanea mollissima*	China	MH121511	MH121432	MH121471	MH121553	MH121593
	CFCC 52577	*Acanthopanax senticosus*	China	MH121512	MH121433	MH121472	MH121554	MH121594
	CFCC 52578	*Sorbus* sp.	China	MH121513	MH121433	MH121473	MH121555	MH121595

Species	Strain	Host	Origin	GenBank accession numbers				
				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe eres	CFCC 52579	*Juglans regia*	China	MH121514	NA	MH121474	MH121556	NA
	CFCC 52580	*Melia azedarace*	China	MH121515	NA	MH121475	MH121557	MH121596
	CFCC 52581	*Rhododendr simsii*	China	MH121516	NA	MH121476	MH121558	MH121597
Diaporthe eres	**CFCC 58816**	***Corylus heterophylla***	**China**	**OQ912953**	**OQ910228**	**NA**	**OQ910288**	**OQ910320**
	CFCC 58817	***Corylus heterophylla***	**China**	**OQ912954**	**OQ910229**	**NA**	**OQ910289**	**OQ910321**
	CFCC 58818	***Populus* sp.**	**China**	**OQ912949**	**OQ910226**	**OQ910258**	**NA**	**OQ910318**
	CFCC 58819	***Populus* sp.**	**China**	**OQ912950**	**OQ910227**	**OQ910259**	**NA**	**OQ910319**
	CFCC 58826	***Spiraea salicifolia***	**China**	**OQ912955**	**OQ910230**	**OQ910260**	**NA**	**OQ910322**
	CFCC 58827	***Spiraea salicifolia***	**China**	**OQ912956**	**OQ910231**	**OQ910261**	**NA**	**OQ910323**
	CFCC 58831	***Ailanthus altissima***	**China**	**OQ912933**	**OQ910208**	**OQ910240**	**OQ910272**	**OQ910300**
	CFCC 58832	***Ailanthus altissima***	**China**	**OQ912934**	**OQ910209**	**OQ910241**	**OQ910273**	**OQ910301**
	CFCC 58833	***Koelreuteria paniculata***	**China**	**OQ912935**	**OQ910210**	**OQ910242**	**OQ910274**	**OQ910302**
	CFCC 58834	***Forsythia suspensa***	**China**	**OQ912936**	**OQ910211**	**OQ910243**	**OQ910275**	**OQ910303**
	CFCC 58835	***Acer palmatum***	**China**	**OQ912937**	**OQ910212**	**OQ910244**	**OQ910276**	**OQ910304**
	CFCC 58836	***Syringa oblata***	**China**	**OQ912938**	**OQ910213**	**OQ910245**	**OQ910277**	**OQ910305**
	CFCC 58837	***Cotinus coggygria***	**China**	**OQ912939**	**OQ910214**	**OQ910246**	**OQ910278**	**OQ910306**
	CFCC 58838	***Platycladus orientalis***	**China**	**OQ912940**	**OQ910215**	**OQ910247**	**OQ910279**	**OQ910307**
	CFCC 58839	***Populus* sp.**	**China**	**OQ912941**	**OQ910216**	**OQ910248**	**OQ910280**	**OQ910308**
	CFCC 58840	***Populus* sp.**	**China**	**OQ912942**	**OQ910217**	**OQ910249**	**OQ910281**	**OQ910309**
	CFCC 58841	***Pinus armandii***	**China**	**OQ912943**	**OQ910218**	**OQ910250**	**OQ910282**	**OQ910310**
	CFCC 58842	***Pinus armandii***	**China**	**OQ912944**	**OQ910219**	**OQ910251**	**OQ910283**	**OQ910311**
	CFCC 58845	***Juglans mandshurica***	**China**	**OQ912945**	**OQ910220**	**OQ910252**	**OQ910284**	**OQ910312**
	CFCC 58846	***Pterocarya stenoptera***	**China**	**OQ912946**	**OQ910221**	**OQ910253**	**OQ910285**	**OQ910313**
	CFCC 58847	***Prunus salicina***	**China**	**OQ912947**	**OQ910222**	**OQ910254**	**OQ910286**	**OQ910314**
	CFCC 58848	***Prunus salicina***	**China**	**OQ912948**	**OQ910223**	**OQ910255**	**OQ910287**	**OQ910315**
Diaporthe eucalyptorum	CBS 132525^{T}	*Eucalyptus* sp.	China	MH305525	NA	NA	NA	NA
Diaporthe foeniculacea	CBS 111553	*Foeniculum vulgare*	Spain	MH854926	KC343343	KC343585	KC343827	KC344069
Diaporthe foikelawen	CBS 145189	*Drimys winteri*	Chile	MN509713	MN974278	NA	MN509735	MN509724
Diaporthe fraxini-angustifoliae	BRIP 54781^{T}	*Fraxinus angustifolia*	Australia	JX862528	KT459462	NA	JX862534	NA
Diaporthe fraxinicola	CFCC 52582^{T}	*Fraxinus chinensis*	China	MH121517	MH121435	NA	MH121560	NA
	CFCC 52583	*Fraxinus chinensis*	China	MH121518	MH121436	NA	MH121559	NA
Diaporthe fructicola	MAFF 246408^{T}	*Passiflora edulis*	Japan	LC342734	LC342738	LC342737	LC342735	LC342736
Diaporthe fukushii	MAFF 625034	*Pyrus pyrifolia*	Japan	NA	KJ435023	KJ420868	NA	KJ420819
Diaporthe fulvicolor	PSCG 051^{T}	*Pyrus pyrifolia*	China	MK626859	MK691132	MK726163	MK654806	MK691236
Diaporthe fusicola	CGMCC 3.17087	*Lithocarpus glabra*	China	KF576281	KF576233	NA	KF576256	KF576305
Diaporthe ganjae	CBS 180.91^{T}	*Cannabis sativa*	USA	KC343112	KC343354	KC343596	KC343838	KC344080
Diaporthe ganzhouensis	CFCC 53087	Unknown	China	MK432665	MK442985	MK443010	MK578139	MK578065
	CFCC 53088	Unknown	China	MK432666	MK442986	MK443011	MK578140	MK578066
Diaporthe garethjonesii	MFLUCC 12-0542a	Unknown	Thailand	KT459423	KT459470	NA	KT459457	KT459441
Diaporthe goulteri	BRIP 55657a^{T}	*Helianthus annuus*	Australia	KJ197290	NA	NA	KJ197252	KJ197270
Diaporthe grandiflori	SAUCC194.84^{T}	*Heterostemma grandiflorum*	China	MT822612	MT855691	MT855580	MT855809	MT855924
Diaporthe guangxiensis	JZB320087^{T}	*Vitis vinifera*	China	MK335765	MK736720	NA	MK523560	MK500161
Diaporthe gulyae	BRIP 54025^{T}	*Helianthus annuus*	Australia	NA	NA	NA	JN645803	KJ197271
Diaporthe guttulata	CGMCC 3.20100^{T}	Unknown	China	MT385950	MW022470	MW022491	MT424685	MT424705
Diaporthe helianthi	CBS 592.81^{T}	*Helianthus annuus*	Serbia	KC343115	KC343357	KC343599	KC343841	KC344083

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				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe helicis	AR5211^{T}	*Hedera helix*	France	KJ210538	KJ435043	KJ420875	KJ210559	KJ420828
Diaporthe heliconiae	SAUCC194.77^{T}	*Heliconia metallica*	China	MT822605	MT855684	MT855573	MT855802	MT855917
Diaporthe heterophyllae	CPC 26215	*Acacia heterophylla*	France	MG600222	MG600218	MG600220	MG600224	MG600226
Diaporthe heterostemmatis	SAUCC194.85^{T}	*Heterostemma grandiflorum*	China	MT822613	MT855692	MT855581	MT855810	MT855925
Diaporthe hickoriae	CBS 145.26^{T}	*Carya glabra*	USA	KC343118	KC343360	NA	KC343844	KC344086
Diaporthe hispaniae	CBS 143351^{T}	*Vitis vinifera*	Spain	MG281123	MG281820	MG281471	MG281644	MG281296
Diaporthe hongkongensis	CBS 115448^{T}	*Dichroa febrifuga*	China	MK304388	KC343361	KC343603	KC343845	KC344087
Diaporthe huairouensis	CFCC 56808	*Corylus heterophylla*	China	ON188788	ON157945	ON157982	ON158016	ON158051
	CFCC 56809	*Corylus heterophylla*	China	OM956120	ON157946	ON157981	ON158015	ON158050
Diaporthe hubeiensis	JZB320123^{T}	*Vitis vinifera*	China	MK335809	MK500235	NA	MK523570	MK500148
Diaporthe incompleta	LC6754	*Camellia sinensis*	China	KX986794	KX999289	KX999265	KX999186	KX999226
Diaporthe inconspicua	CBS 133813^{T}	*Maytenus ilicifolia*	Brazil	NA	KC343365	KC343607	KC343849	KC344091
Diaporthe infecunda	CBS 133812^{T}	*Schinus terebinthifolius*	Brazil	KC343126	KC343368	KC343610	KC343852	KC344094
Diaporthe irregularis	CGMCC 3.20092^{T}	Unknown	China	MT385951	MT424721	NA	MT424686	MT424706
Diaporthe isoberliniae	CPC 22549	*Isoberlinia angolensis*	Zambia	KJ869190	NA	NA	NA	KJ869245
Diaporthe juglandicola	CFCC 51134^{T}	*Juglans mandshurica*	China	KU985101	KX024616	KX024622	KX024628	KX024634
	CFCC 51135	*Juglans mandshurica*	China	KU985102	KX024617	KX024623	KX024629	KX024635
Diaporthe juglandigena	CFCC 52584	*Juglans regia*	China	MH121519	MH121437	MH121477	MH121561	MH121598
	CFCC 52585	*Juglans regia*	China	MH121520	MH121438	MH121478	MH121562	MH121599
Diaporthe kadsurae	CFCC 52586^{T}	*Kadsura longipedunculata*	China	MH121521	MH121439	MH121479	MH121563	MH121600
	CFCC 52587	*Kadsura longipedunculata*	China	MH121522	MH121440	MH121480	MH121564	MH121601
Diaporthe kochmanii	BRIP 54033^{T}	*Helianthus annuus*	Australia	NA	NA	NA	JN645809	NA
Diaporthe kongii	BRIP 54031^{T}	*Helianthus annuus*	Australia	NA	NA	NA	NA	KJ197272
Diaporthe krabiensis	MFLUCC 17-2481^{T}	*Bruguiera* sp.	Unknown	MN047101	NA	NA	MN433215	MN431495
Diaporthe lenispora	CGMCC 3.20101^{T}	Unknown	China	MT385952	MW022472	MW022493	MT424687	MT424707
Diaporthe litchicola	BRIP 54900^{T}	*Litchi chinensis*	Australia	LC041036	NA	NA	JX862539	NA
Diaporthe litchii	SAUCC194.22^{T}	*Litchi chinensis*	China	MT822550	MT855635	MT855519	MT855747	MT855863
Diaporthe lithocarpus	CGMCC 3.15175^{T}	*Lithocarpus glabra*	China	KC135104	KF576235	NA	KC153095	KF576311
Diaporthe longicicola	CGMCC 3.17089^{T}	*Lithocarpus glabra*	China	KF576267	NA	NA	KF576242	KF576291
Diaporthe longicolla	FAU599	*Glycine max*	USA	KJ590728	KJ612124	KJ659188	KJ590767	KJ610883
Diaporthe longispora	CBS 194.36^{T}	*Ribes* sp.	Canada	MH855769	KC343377	KC343619	KC343861	KC344103
Diaporthe lonicerae	MFLUCC 17-0963^{T}	*Lonicera* sp.	Italy	KY964190	KY964116	NA	KY964146	KY964073
Diaporthe lusitanicae	CBS 123212^{T}	*Foeniculum vulgare*	Portugal	MH863279	KC343378	KC343620	KC343862	KC344104
Diaporthe lutescens	SAUCC194.36^{T}	*Chrysalidocarpus lutescens*	China	MT822564	MT855647	MT855533	MT855761	MT855877
Diaporthe macadamiae	BRIP66526^{T}	*Macadamia* sp.	Australia	MN708230	NA	NA	MN696528	MN696539
Diaporthe machili	SAUCC194.111^{T}	*Machilus pingii*	China	MT822639	MT855718	MT855606	MT855951	MT855836
Diaporthe macintoshii	BRIP 55064a^{T}	*Rapistrum rugosum*	Australia	KJ197289	NA	NA	KJ197251	KJ197269
Diaporthe mahothocarpus	CGMCC 3.15181	*Lithocarpus glabra*	China	KC153096	NA	NA	KC153087	KF576312
Diaporthe malorum	CAA 734	*Malus domestica*	Portugal	KY435638	KY435658	KY435648	KY435627	KY435668
Diaporthe marina	MFLU 17-2622	NA	Thailand	MN047102	NA	NA	NA	NA
Diaporthe maritima	DAOM 695742^{T}	*Picea ruben*	Canada	KU552025	NA	NA	KU552023	KU574615
Diaporthe masirevicii	BRIP 54256	*Glycine max*	Australia	KJ197277	NA	NA	KJ197238	KJ197256
Diaporthe mayteni	CBS 133185^{T}	*Maytenus ilicifolia*	Brazil	KC343139	KC343381	KC343623	KC343865	KC344107

Species	Strain	Host	Origin	GenBank accession numbers				
				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe maytenicola	CPC 21896^{T}	*Maytenus acuminata*	South Africa	KF777157	NA	NA	NA	KF777250
Diaporthe mediterranea	SAUCC194.111	*Machilus pingii*	China	MT822639	MT855718	MT855606	MT855836	MT855951
Diaporthe melastomatis	SAUCC194.55^{T}	*Melastoma malabathricum*	China	MT822583	MT855664	MT855551	MT855780	MT855896
Diaporthe melonis	CBS 435.87	*Glycine soja*	Indonesia	KC343141	KC343383	KC343625	KC343867	KC344109
Diaporthe middletonii	BRIP 54884e^{T}	*Rapistrum rugosum*	Australia	KJ197286	NA	NA	KJ197248	KJ197266
Diaporthe minima	GZCC19-0066^{T}	Unknown	China	MT385953	MT424722	MW022496	MT424688	MT424708
Diaporthe minusculata	GZCC19-0215^{T}	Unknown	China	MT385957	MW022475	MW022499	MT424692	MT424712
Diaporthe miriciae	BRIP 54736j^{T}	*Helianthus annuus*	Australia	KJ197282	NA	NA	KJ197244	KJ197262
Diaporthe momicola	MFLUCC 16-0113	*Prunus persica*	China	KU557563	NA	KU557611	KU557631	KU55758
Diaporthe multigutullata	CFCC 53095	*Citrus maxima*	China	MK432645	MK442967	MK442992	MK578121	MK578048
	CFCC 53096	*Citrus maxima*	China	MK432646	MK442968	MK442993	MK578122	MK578049
Diaporthe musigena	CBS 129519^{T}	*Musa* sp.	Australia	KC343143	KC343385	KC343267	KC343869	KC344111
Diaporthe myracrodruonis	URM7972^{T}	*Myracrodruon urundeuva*	Unknown	MK205289	MK205290	NA	MK213408	MK205291
Diaporthe neilliae	CBS 144.27^{T}	*Spiraea* sp.	USA	KC343144	KC343386	KC343628	KC343870	KC344112
Diaporthe neoarctii	CBS 109490^{T}	*Ambrosia trifida*	USA	KC343145	KC343387	KC343629	KC343871	KC344113
Diaporthe neoraonikayaporum	MFLUCC 14-1136	*Tectona grandis*	Thailand	KU712449	KU749356	NA	KU749369	KU743988
Diaporthe nobilis	CBS 587.79	*Pinus parviflora*	Japan	KC343153	KC343395	KC343637	KC343879	KC344121
Diaporthe nothofagi	BRIP 54801^{T}	*Nothofagus cunninghamii*	Australia	JX862530	NA	NA	JX862536	KF170922
Diaporthe novem	CBS 127269^{T}	*Glycine max*	Croatia	KC343155	KC343397	KC343639	KC343881	KC344123
Diaporthe ocoteae	CPC 26217^{T}	*Ocotea bullata*	France	KX228293	NA	NA	NA	KX228388
Diaporthe oraccinii	LC3166^{T}	*Camellia sinensis*	China	KP267863	NA	KP293517	KP267937	KP293443
Diaporthe ovalispora	ZJUD93	*Citrus limon*	China	KJ490628	NA	KJ490570	KJ490507	KJ490449
Diaporthe ovoicicola	CGMCC 3.17093	*Lithocarpus glabra*	China	KF576265	KF576223	NA	KF576240	KF576289
Diaporthe oxe	CBS 133186^{T}	*Maytenus ilicifolia*	Brazil	KC343164	KC343406	KC343648	KC343890	KC344132
Diaporthe padina	CFCC 52590^{T}	*Padus racemosa*	China	MH121525	MH121443	MH121483	MH121567	MH121604
	CFCC 52591	*Padus racemosa*	China	MH121526	MH121444	MH121484	MH121568	MH121605
Diaporthe pandanicola	MFLUCC 17-0607	Pandanaceae	Thailand	MG646974	NA	NA	NA	MG646930
Diaporthe paranensis	CBS 133184^{T}	*Maytenus ilicifolia*	Brazil	KC343171	KC343413	KC343655	KC343897	KC344139
Diaporthe parapterocarpi	CBS 137986	*Pterocarpus brenanii*	Zambia	KJ869138	NA	NA	NA	KJ869248
Diaporthe parvae	PSCG 035	*Pyrus bretschneideri*	China	MK626920	MK691169	MK726211	MK654859	MK691249
Diaporthe pascoei	BRIP 54847^{T}	*Persea americana*	Australia	MK111097	NA	NA	JX862538	KF170924
Diaporthe passiflorae	CPC 19183	*Passiflora edulis*	Netherlands	JX069860	NA	NA	NA	NA
Diaporthe passifloricola	CPC 27480^{T}	*Passiflora foetida*	Malaysia	KX228292	NA	KX228367	NA	KX228387
Diaporthe penetriteum	LC3215	*Camellia sinensis*	China	KP267879	NA	NA	KP293532	KP267953
Diaporthe perjuncta	CBS 109745^{T}	*Ulmus glabra*	Austria	KC343172	KC343414	KC343656	KC343898	KC344140
Diaporthe perseae	CBS 151.73	*Persea gratissima*	Netherlands	KC343173	KC343415	NA	NA	NA
Diaporthe pescicola	MFLUCC 16-0105	*Prunus persica*	China	KU557555	KU557603	NA	KY400831	KU557579
Diaporthe phaseolorum	AR4203^{T}	*Phaseolus vulgaris*	USA	KJ590738	KJ612135	KJ659220	KJ590739	KJ610893
Diaporthe phillipsii	CAA 817	*Vaccinium corymbosum*	Portugal	MK792305	MK883831	MK871445	MK828076	MN000351
Diaporthe pimpinellae	JZB320131^{T}	*Pimpinella peregrine*	Italy	MK874656	NA	MT373073	MT373074	MT373072
Diaporthe podocarpi-macrophylli	LC6155	*Podocarpus macrophyllus*	Japan	KX986774	KX999278	KX999246	KX999167	KX999207
Diaporthe pometiae	SAUCC194.72^{T}	*Pometia pinnata*	China	MT822600	MT855679	MT855568	MT855797	MT855912

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				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe pseudoalnea	CFCC 54190^{T}	*Alnus glutinosa*	Netherlands	MZ727037	MZ753468	MZ781302	MZ816343	MZ753487
Diaporthe pseudomangiferae	CBS 101339^{T}	*Mangifera indica*	Dominican Republic	KC343181	KC343423	KC343665	KC343907	KC344149
Diaporthe pseudophoenicicola	CBS 176.77	*Mangifera indica*	Iraq	KC343183	KC343425	KC343667	KC343909	KC344151
Diaporthe pseudotsugae	MFLU 15-3228^{T}	*Pseudotsuga menziesii*	Italy	KY964225	KY964138	NA	KY964181	KY964108
Diaporthe psoraleae	CPC 21634	*Psoralea pinnata*	South Africa	KF777158	NA	NA	KF777245	KF777251
Diaporthe psoraleae-pinnatae	CPC 21638^{T}	*Psoralea pinnata*	South Africa	KF777159	NA	NA	NA	KF777252
Diaporthe pterocarpi	MFLUCC 10-0571^{T}	*Pterocarpus indicus*	Thailand	JQ619899	JX197451	NA	JX275416	JX275460
Diaporthe pterocarpicola	MFLUCC 10-0580a^{T}	*Pterocarpus indicus*	Thailand	JQ619887	JX197433	NA	JX275403	JX275441
Diaporthe pulla	CBS 338.89^{T}	*Hedera helix*	Yugoslavia	KC343152	KC343394	KC343636	KC343878	KC344120
Diaporthe pungensis	SAUCC194.112^{T}	*Elaeagnus pungens*	China	MT822640	MT855719	MT855607	MT855837	MT855952
Diaporthe pyracanthae	CAA483	*Pyracantha coccinea*	Portugal	KY435635	KY435645	KY435656	KY435625	KY435666
Diaporthe racemosae	CPC 26646	*Euclea racemosa*	South Africa	MG600223	MG600219	MG600221	MG600225	MG600227
Diaporthe raonikayaporum	CBS 133182	*Spondias mombin*	Brazil	KC343188	KC343430	KC343672	KC343914	KC344156
Diaporthe ravennica	MFLUCC 16-0997	*Clematis vitalba*	Italy	NA	NA	NA	MT394670	NA
Diaporthe rhusicola	CPC 18191	*Rhus pendulina*	South Africa	JF951146	NA	NA	NA	NA
Diaporthe rosae	MFLUCC 17-2658	*Rosa* sp.	United Kingdom	MG828894	MG829273	NA	NA	MG843878
Diaporthe rosicola	MFLU 17-0646^{T}	*Rosa* sp.	United Kingdom	MG828895	MG829274	NA	MG829270	MG843877
Diaporthe rosiphthora	COAD 2914^{T}	*Rosa* sp.	Brazil	MT311197	MT313691	NA	MT313693	NA
Diaporthe rossmaniae	CAA 762^{T}	*Vaccinium corymbosum*	Portugal	MK792290	MK883822	MK871432	MK828063	MK837914
Diaporthe rostrata	CFCC 50062^{T}	*Juglans mandshurica*	China	KP208847	KP208849	KP208851	KP208853	KP208855
	CFCC 50063	*Juglans mandshurica*	China	KP208848	KP208850	KP208852	KP208854	KP208856
Diaporthe rostrata	**CFCC 58843**	***Juglans mandshurica***	**China**	**OQ912951**	**NA**	**NA**	**NA**	**NA**
	CFCC 58844	***Juglans mandshurica***	**China**	**OQ912952**	**NA**	**NA**	**NA**	**NA**
Diaporthe rudis	AR3422^{T}	*Laburnum anagyroides*	Austria	KC843331	KC843146	NA	KC843090	KC843177
Diaporthe saccarata	CBS 116311^{T}	*Protea repens*	South Africa	KC343190	KC343432	KC343674	KC343916	KC344158
Diaporthe sackstonii	BRIP 54669b^{T}	*Helianthus annuus*	Australia	KJ197287	NA	NA	KJ197249	KJ197267
Diaporthe salicicola	BRIP 54825^{T}	*Salix purpurea*	Australia	JX862531	NA	NA	JX862537	KF170923
Diaporthe sambucusii	CFCC 51986^{T}	*Sambucus williamsii*	China	KY852495	KY852499	KY852503	KY852507	KY852511
	CFCC 51987	*Sambucus williamsii*	China	KY852496	KY852500	KY852504	KY852508	KY852512
Diaporthe schimae	CFCC 53103	*Schima superba*	China	MK442640	MK442962	MK442987	MK578116	MK578043
	CFCC 53104	*Schima superba*	China	MK442641	MK442963	MK442988	MK578117	MK578044
	CFCC 53105	*Schima superba*	China	MK442642	MK442964	MK442989	MK578118	MK578045
Diaporthe schini	CBS 133181^{T}	*Schinus terebinthifolius*	Brazil	KC343191	KC343433	KC343675	KC343917	KC344159
Diaporthe schisandrae	CFCC 51988^{T}	*Schisandra chinensis*	China	KY852497	KY852501	KY852505	KY852509	KY852513
	CFCC 51989	*Schisandra chinensis*	China	KY852498	KY852502	KY852506	KY852510	KY852514
Diaporthe schoeni	MFLU 15-1279^{T}	*Schoenus nigricans*	Italy	KY964226	KY964139	NA	KY964182	KY964109
Diaporthe sclerotioides	CBS 296.67	*Cucumis sativus*	Netherlands	MH858974	KC343435	KC343677	KC343919	KC344161
Diaporthe searlei	BRIP 66528^{T}	*Macadamia* sp.	Australia	MN708231	NA	NA	NA	MN696540
Diaporthe sennae	CFCC 51636^{T}	*Senna bicapsularis*	China	KY203724	KY228875	NA	KY228885	KY228891
	CFCC 51637	*Senna bicapsularis*	China	KY203725	KY228876	NA	KY228886	KY228892
Diaporthe sennicola	CFCC 51634^{T}	*Senna bicapsularis*	China	KY203722	KY228873	KY228879	KY228883	KY228889
	CFCC 51635	*Senna bicapsularis*	China	KY203723	KY228874	KY228880	KY228884	KY228890

Species	Strain	Host	Origin	GenBank accession numbers				
				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe serafiniae	BRIP 55665a^{T}	*Helianthus annuus*	Australia	KJ197274	NA	NA	KJ197236	KJ197254
Diaporthe shaanxiensis	CFCC 53106	*Liana* sp.	China	MK432654	MK442976	MK443001	MK578130	NA
	CFCC 53107	*Liana* sp.	China	MK432655	MK432977	MK432002	MK578131	NA
Diaporthe siamensis	MFLUCC 10-0573a	*Dasymaschalon* sp.	Thailand	NA	JQ619897	NA	JX275393	JX275429
Diaporthe silvicola	CFCC 54191^{T}	*Fraxinus excelsior*	Netherlands	MZ727041	MZ753472	MZ753481	MZ816347	MZ753491
Diaporthe sojae	FAU635^{T}	*Glycine max*	USA	KJ590719	KJ612116	KJ659208	KJ590762	KJ610875
Diaporthe spartinicola	CPC 24951	*Spartium junceμm*	Spain	KR611879	NA	KR857696	NA	KR857695
Diaporthe spinosa	PSCG 383^{T}	*Pyrus pyrifolia*	China	MK626849	MK691129	MK726156	MK654811	MK691234
Diaporthe sterilis	CBS 136969^{T}	*Vaccinium corymbosum*	Italy	KJ160579	KJ160548	MF418350	KJ160611	KJ160528
Diaporthe stictica	CBS 370.54	*Buxus sampervirens*	Italy	KC343212	KC343454	KC343696	KC343938	KC344180
Diaporthe subclavata	ZJUD95	*Citrus unshiu*	China	KJ490630	NA	KJ490572	KJ490509	KJ490451
Diaporthe subcylindrospora	KUMCC 17-0151	Unknown	China	MG746629	NA	NA	MG746630	MG746631
Diaporthe subellipicola	KUMCC 17-0153	Unknown	China	MG746632	NA	NA	MG746633	MG746634
Diaporthe subordinaria	CBS 464.90	*Plantago lanceolata*	South Africa	KC343214	KC343456	KC343698	KC343940	KC344182
Diaporthe taoicola	MFLUCC 16-0117	*Prunus persica*	China	KU557567	NA	NA	KU557636	KU557591
Diaporthe tarchonanthi	CBS 146073^{T}	*Tarchonanthus littoralis*	South Africa	MT223794	NA	NA	MT223759	MT223733
Diaporthe tectonae	MFLUCC 12-0777	*Tectona grandis*	Thailand	KU712430	KU749345	NA	KU749359	KU743977
Diaporthe tectonendophytica	MFLUCC 13-0471	*Tectona grandis*	Thailand	KU712439	KU749354	NA	KU749367	KU743986
Diaporthe tectonigena	MFLUCC 12-0767	*Camellia sinensis*	China	KX986782	KX999284	KX999254	KX999174	KX999214
Diaporthe terebinthifolii	CBS 133180^{T}	*Schinus terebinthifolius*	Brazil	KC343216	KC343458	KC343700	KC343942	KC344184
Diaporthe ternstroemia	CGMCC 3.15183	*Ternstroemia gymnanthera*	China	KC153098	NA	NA	KC153089	NA
Diaporthe thunbergii	MFLUCC 10-0576a^{T}	*Thunbergia laurifolia*	Thailand	JQ619893	JX197440	NA	JX275409	NA
Diaporthe thunbergiicola	MFLUCC 12-0033^{T}	*Thunbergia laurifolia*	Thailand	KP715097	NA	NA	KP715098	NA
Diaporthe tibetensis	CFCC 51999^{T}	*Juglandis regia*	China	MF279843	MF279888	MF279828	MF279858	MF279873
	CFCC 52000	*Juglandis regia*	China	MF279844	MF279889	MF279829	MF279859	MF279874
Diaporthe torilicola	MFLUCC 17-1051^{T}	*Torilis arvensis*	Italy	KY964212	KY964127	NA	KY964168	KY964096
Diaporthe toxica	CBS 534.93^{T}	*Lupinus angustifolius*	Australia	KC343220	KC343462	KC343704	KC343946	KC344188
Diaporthe tulliensis	BRIP 62248a	*Theobroma cacao*	Australia	KR936130	NA	NA	KR936133	KR936132
Diaporthe ueckerae	FAU656^{T}	*Cucumis melo*	USA	KJ590726	KJ612122	KJ659215	KJ590747	KJ610881
Diaporthe ukurunduensis	CFCC 52592^{T}	*Acer ukurunduense*	China	MH121527	MH121445	MH121485	MH121569	NA
	CFCC 52593	*Acer ukurunduense*	China	MH121528	MH121446	MH121486	MH121570	NA
Diaporthe ulmina	**CFCC 58828^{T}**	***Ulmus pumil*a**	**China**	**OQ912957**	**OQ910232**	**OQ910262**	**OQ910290**	**OQ910324**
	CFCC 58829	***Ulmus pumila***	**China**	**OQ912958**	**OQ910233**	**OQ910263**	**OQ910291**	**OQ910325**
	CFCC 58830	***Ulmus pumila***	**China**	**OQ912959**	**NA**	**NA**	**NA**	**NA**
Diaporthe undulata	LC6624	Unknown	China	KX986798	NA	KX999269	KX999190	KX999230
Diaporthe unshiuensis	CFCC 52594	*Carya illinoensis*	China	MH121529	MH121447	MH121487	MH121571	MH121606
	CFCC 52595	*Carya illinoensis*	China	MH121530	MH121448	MH121488	MH121572	MH121607
Diaporthe vaccinii	CBS 160.32^{T}	*Oxycoccus macrocarpos*	USA	MH121502	MH121426	MH121462	MH121544	MH121584
Diaporthe vacuae	CAA830	*Vaccinium corymbosum*	Portugal	MK792306	MK883832	MK871446	MK828077	MK837928
Diaporthe vangueriae	CBS 137985^{T}	*Vangueria infausta*	Zambia	KJ869137	NA	NA	NA	KJ869247
Diaporthe vawdreyi	BRIP 57887a	*Psidium guajava*	Australia	KR936126	NA	NA	KR936129	KR936128

Species	Strain	Host	Origin	GenBank accession numbers				
				ITS	*cal*	*his3*	*tef1-α*	*tub2*
Diaporthe velutina	LC4421	*Neolitsea* sp.	China	KX986790	NA	KX999261	KX999182	KX999223
Diaporthe verniciicola	CFCC 53109	*Vernicia montana*	China	MK573944	MK574583	MK574599	MK574619	MK574639
	CFCC 53110	*Vernicia montana*	China	MK573945	MK574584	MK574600	MK574620	MK574640
Diaporthe viniferae	JZB320071^{T}	*Vitis vinifera*	China	MK341551	MK500119	NA	MK500107	MK500112
Diaporthe virgiliae	CMW 40748	*Virgilia oroboides*	South Africa	KP247556	NA	NA	NA	KP247575
Diaporthe xishuangbanica	LC6707	*Camellia sinensis*	China	KX986783	NA	KX999255	KX999175	KX999216
Diaporthe xunwuensis	CFCC 53085	Unknown	China	MK432663	MK442983	MK443008	MK578137	MK578063
	CFCC 53086	Unknown	China	MK432664	MK442984	MK443009	MK578138	MK578064
Diaporthe yunnanensis	LC6168	Unknown	China	KX986796	KX999290	KX999267	KX999188	KX999228
Diaporthe zaobaisu	PSCG 031^{T}	*Pyrus bretschneideri*	China	MK626922	NA	MK726207	MK654855	MK691245
Diaporthella corylina	CBS 121124	*Corylus* sp.	NA	KC343004	KC343246	KC343488	KC343730	KC343972

Note: NA, not applicable. Strains in this study are marked in bold.
Acronyms of culture collection: AR, DP, FAU isolates in culture collection of Systematic Mycology and Microbiology Laboratory, USDA-ARS, Beltsville, Maryland, USA; BRIP: Australian plant pathogen culture collection, Queensland, Australia; CAA: Personal Culture Collection Artur Alves, University of Aveiro, Aveiro, Portugal; CBS: Westerdijk Fungal Biodiversity Institute, Utrecht, The Netherlands; CFCC: China Forestry Culture Collection Center, China; CGMCC: China General Microbiological Culture Collection; CMW: culture collection (CMW) of the Forestry and Agricultural Biotechnology Institute; COAD: Coleção Octávio Almeida Drummond, Universidade Ferderal de Viçosa, Viçosa, Brazil; CPC: Collection Pedro Crous, housed at CBS; DAOM, Canadian Collection of Fungal Cultures or the National Mycological Herbarium, Plant Research Institute, Department of Agriculture (Mycology), Ottawa, Canada; IFRDCC: International Fungal Research and Development Centre Culture Collection, Chinese Academy of Forestry, Kunming, China; JZB, Culture collection of Institute of Plant and Environment Protection, Beijing Academy of Agriculture and Forestry Sciences, Beijing 100097, China. LC: working collection of Lei Cai, housed at Institute of Microbiology, CAS, China; MAFF: Ministry of Agriculture, Forestry and Fisheries, Tsukuba, Ibaraki, Japan; MFLUCC: Mae Fah Luang University Culture Collection; SAUCC: Shandong Agricultural University Culture Collection; ZJUD: Zhe Jiang University, China.

Maximum-likelihood (ML) analyses were conducted with 100 bootstrap support pseudoreplicates and the appropriate models for each gene using PhyML v. 3.0 (Guindon et al. 2010; Kozlov et al. 2019). Bayesian inference (BI) was conducted with a Markov Chain Monte Carlo (MCMC) algorithm in MrBayes v. 3.1.2 (Ronquist and Huelsenbeck 2003). MrModeltest v. 2.3 was used to estimate the best fit evolutionary models for each partitioned locus following the Akaike Information Criterion (AIC) (Posada and Crandall 1998). Two MCMC chains were run from random trees for 1,000,000 generations and stopped when the average standard deviation of split frequencies fell below 0.01. Trees were sampled every 100th generation, resulting in a total of 10,000 trees. For each analysis, the first 25% of the trees were discarded as the burn-in phase and the remaining 75% trees were assessed to calculate the posterior probabilities (BPP) (Rannala and Yang 1996). Phylograms were viewed by using FigTree v. 1.3.1 and edited in Adobe Illustrator CS6 v. 16.0.0 (Rambaut and Drummond 2010).

Results

Phylogenetic analyses

The concatenated sequences of five genetic regions (ITS, *cal*, *his3*, *tef1-α* and *tub2*) were analysed to infer the interspecific relationships within *Diaporthe*. The dataset consisted of 343 sequences including the outgroup, *Diaporthella corylina* CBS 121124. A total of 2,919 characters including gaps (547 for ITS, 578 for *cal*, 618 for *his3*, 619 for *tef1-α* and 557 for *tub2*) were included in the phylogenetic analysis. The topologies resulting from ML and BI analyses of the concatenated dataset were similar. ML bootstraps (ML BS ≥ 50%) and Bayesian posterior probabilities (BPP ≥ 0.95) have been shown above the branches (Fig. 1). In this study, 35

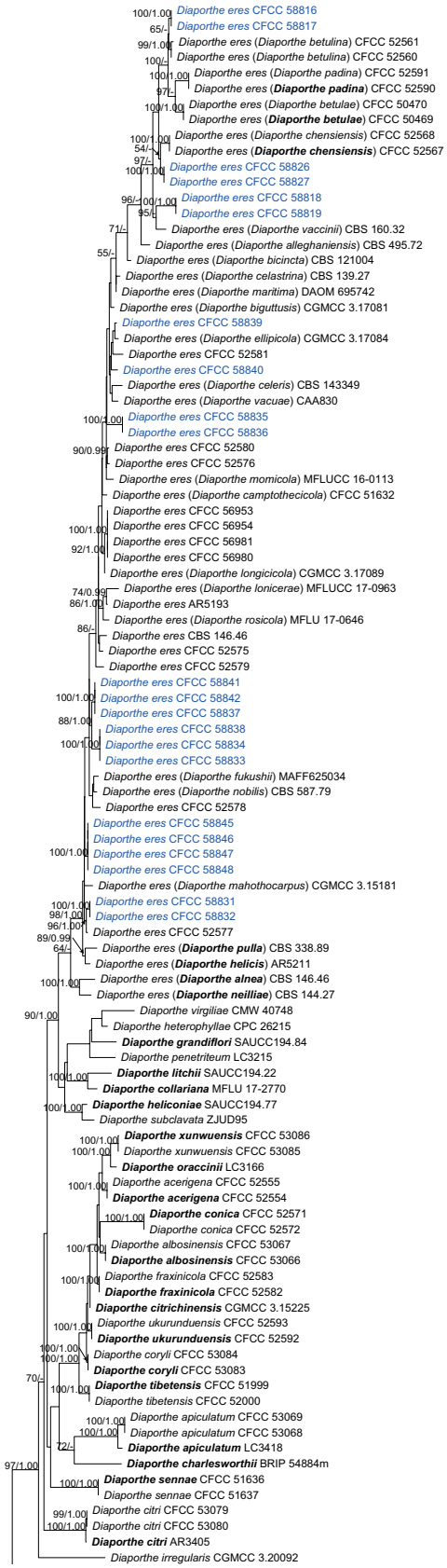

Figure 1. Phylogenetic tree of *Diaporthe* resulting from a Maximum-Likelihood (ML) analysis, based on the concatenated sequences from ITS, *cal*, *his3*, *tef1-α* and *tub2* genetic regions. Numbers above the branches indicate ML bootstraps (left, ML BS ≥ 50%) and Bayesian posterior probabilities (right, BPP ≥ 0.90). The tree is rooted with *Diaporthella corylina* CBS 121124. Isolates from the present study are marked in blue and holotype isolates are indicated in bold.

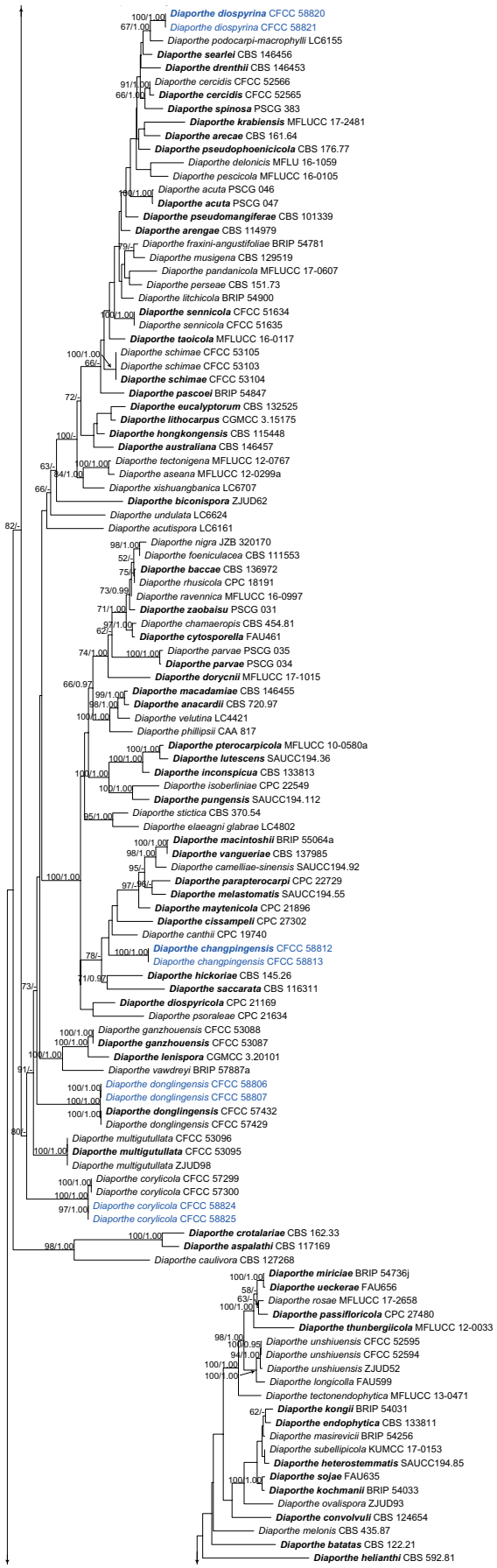

Figure 1. Continued.

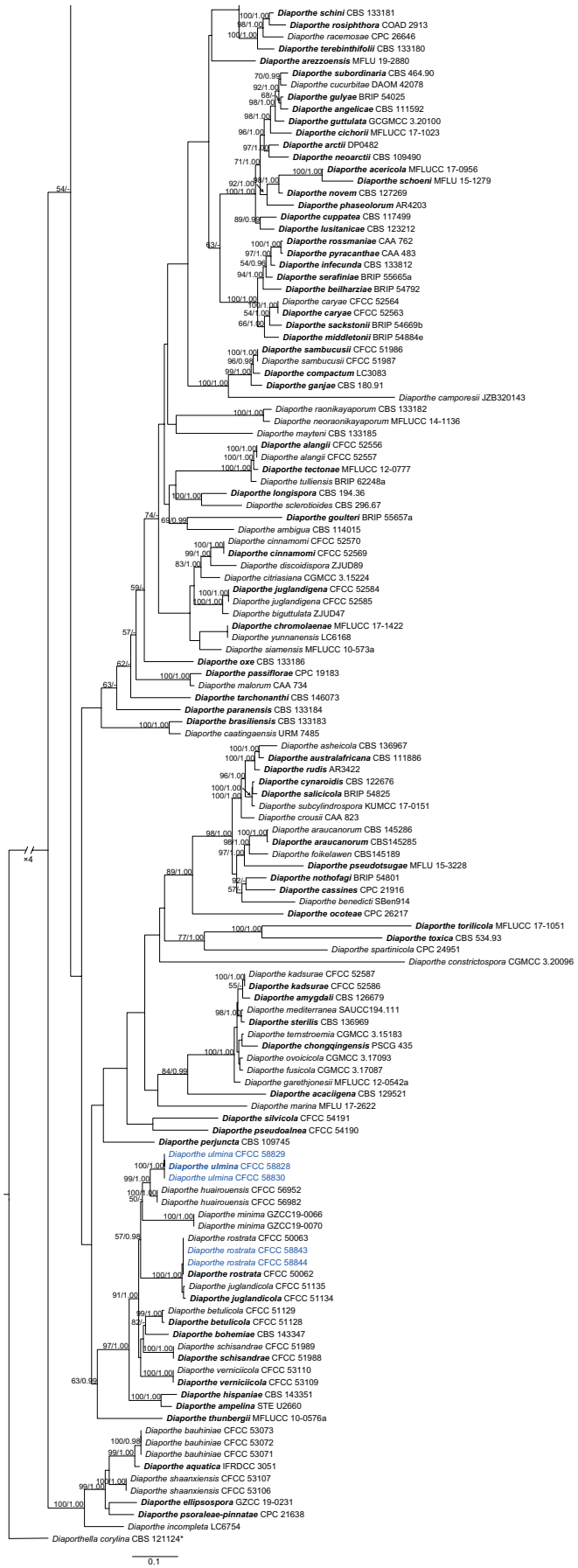

Figure 1. Continued.

isolates formed seven clades representing seven species of *Diaporthe*, of which 22 isolates represented *D. eres*, CFCC 58824 and 58825 clustered together with *D. corylicola*, CFCC 58806 and 58807 grouped with *D. donglingensis* and CFCC 58843 and 58844 represented *D. rostrata*. The remaining seven isolates formed three distinct clades representing three new species which have been described below.

Taxonomy

***Diaporthe changpingensis* Y.K. Bai & X.L. Fan, sp. nov.**
MycoBank No: 847165
Fig. 2

Etymology. Named after the place where it was first collected, Changping District, Beijing City.

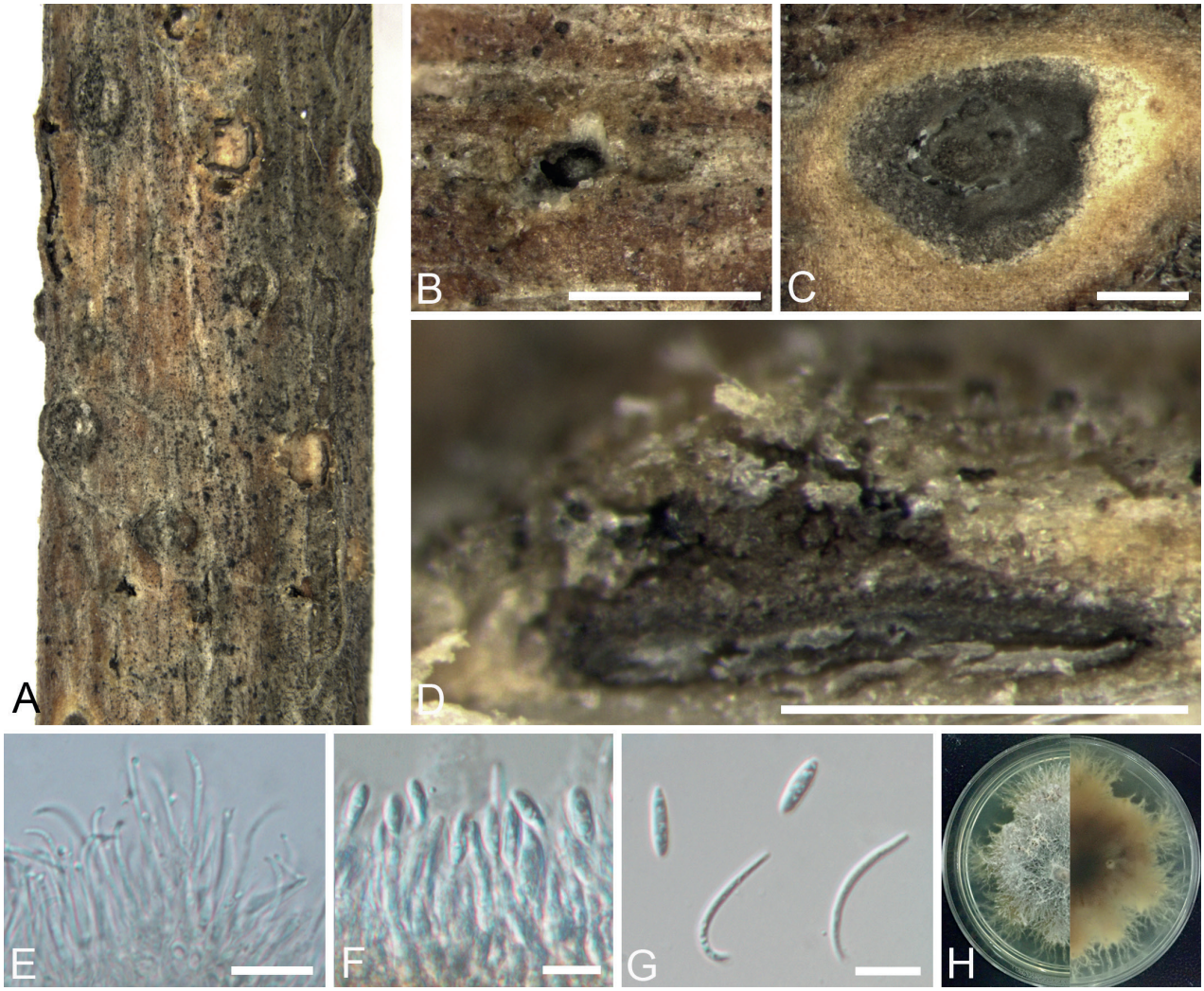

Figure 2. *Diaporthe changpingensis* from *Robinia pseudoacacia* (BJFC CF202212141) **A, B** habit of conidiomata on branch **C** transverse section of conidioma **D** longitudinal section through conidioma **E, F** conidiophores and conidiogenous cells **G** alpha and beta conidia **H** top (left) and bottom (right) sides of colonies on potato dextrose agar (PDA) after 7 days. Scale bars: 500 µm (**B, C**); 200 µm (**D**); 10 µm (**E–G**).

Description. Sexual morph not observed. Asexual morph: Conidiomata pycnidial, conical, immersed in bark, scattered, erumpent through the surface, with a solitary locule. Locule undivided, 620–830 µm diam. Conidiophores cylindrical, attenuate towards the apex, hyaline, phialidic, unbranched, slightly curved, 8.5–12.5 × 1.0–2.0 µm (av. = 10 ± 1.3 × 1.6 ± 0.3 µm, n = 50). Conidiogenous cells enteroblastic, phialidic, subcylindrical to cylindrical, 6.5–9.5 × 1.0–2.0 µm (av. = 8.0 ± 1.1 × 1.7 ± 0.2 µm, n = 50). Alpha conidia hyaline, aseptate, fusiform to oval, multi-guttulate, acute at both ends, 5.5–9.0 × 1.5–3.0 µm (av. = 6.5 ± 0.7 × 2.1 ± 0.5 µm, n = 50), L/W = 3.0–4.0 (av. = 3.5 ± 0.3, n = 50). Beta conidia hyaline, aseptate, filiform, straight or hamate, eguttulate, 13.0–19.0 × 1.0–2.0 µm (av. = 15.5 ± 1.5 × 1.5 ± 0.3 µm, n = 50), L/W = 9–11 (av. = 10 ± 0.4, n = 50).

Culture characteristics. Cultures on PDA initially white, growing slowly and entirely covering the 9 cm Petri dish after 14 days. The colonies flat, lacking aerial mycelium with an irregular edge. Conidiomata not observed on medium surface until 30 days.

Specimens examined. China, Beijing City, Changping District, Baihujian Forest Park, 40°7'34.15"N, 116°5'30.26"E, on twigs and branches of *Robinia pseudoacacia*, 20 Aug 2022, Y.K. Bai, L. Lin & M. Pan (holotype BJFC CF202212141, ex-type living culture: CFCC 58812; other living culture: CFCC 58813).

Notes. *Diaporthe changpingensis* was isolated from *Robinia pseudoacacia*. The molecular phylogenies of this species show a clearly different position in this study with high support (ML/BI = 100/1.00). This species appears most closely related to *D. canthii*. However, *D. changpingensis* can be distinguished from *D. canthii*, based on ITS, *tef1-α* and *tub2* loci (23/458 in ITS, 38/326 in *tef1-α* and 31/417 in *tub2*). Morphologically, *D. changpingensis* differs from *D. canthii* in having shorter alpha conidia (5.5–9.0 vs. 12.0–14.0 µm) and shorter beta conidia (13.0–19.0 vs. 18.0–25.0 µm) (Crous et al. 2012). Therefore, we described *D. changpingensis* as a novel species, based on morphology and sequence data.

Diaporthe corylicola H. Gao & X.L. Fan, Front. Cell. Infect. Microbiol. 11: 664366 (2021).

Description. See Gao et al. (2021).

Specimens examined. China, Beijing City, Yanqing District, Songshan National Nature Reserve, 40°30'4.32"N, 115°49'56.46"E, from branches of *Corylus heterophylla*, 17 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF202212148, cultures CFCC 58824 and 58825).

Notes. *Diaporthe corylicola* was isolated from *Corylus heterophylla* in Beijing, China (Gao et al. 2021). This species is similar to *D. coryli* in culture morphology, but it can be distinguished by its longer and thinner alpha conidia (11.0–16.5 × 2.0–3.5 vs. 11.5–13.0 × 3.0–3.5 µm) (Gao et al. 2021). The isolates in this study clustered with *D. corylicola*, while the phylogram supported it belonging to this species because of the identical DNA sequence.

Diaporthe diospyrina **Y.K. Bai & X.L. Fan, sp. nov.**
MycoBank No: 847473
Fig. 3

Etymology. Named after the host genus on which it was collected, *Diospyros*.

Description. Sexual morph not observed. Asexual morph: Conidiomata pycnidial, conical, immersed in bark, scattered, erumpent through the surface, with a solitary locule. Locule undivided, 250–430 µm diam. Conidiophores cylindrical, attenuate towards the apex, hyaline, phialidic, unbranched, slightly curved, 10.0–27.0 × 0.5–2.0 µm (av. = 16.5 ± 4 × 1.3 ± 0.5 µm, n = 50). Conidiogenous cells enteroblastic, phialidic, subcylindrical to cylindrical, 4.5–8.0 × 1.0–2.0 µm (av. = 6.2 ± 1.2 × 1.3 ± 0.2 µm, n = 50). Alpha conidia hyaline, aseptate, oval, one guttulate at each end, 7.5–9.0 × 2.0–3.5 µm (av. = 8.2 ± 0.6 × 2.8 ± 0.3 µm, n = 50), L/W = 2.0–3.5 (av. = 2.7 ± 0.4, n = 50). Beta conidia not observed.

Culture characteristics. Colonies with felty aerial mycelium initially white, growing to 80 mm after 3 days, with a uniform texture and regular edge, becoming umber after 9 days. Conidiomata black, distributed randomly at the marginal area.

Specimens examined. China, Beijing City, Yanqing Distinct, Yeya Lake, 40°25'31.25"N, 115°51'36.34"E, from branches of *Diospyros kaki*, 14 Jun 2022, Y.K. Bai & X.L. Fan (holotype BJFC CF202212147, ex-type living culture: CFCC 58820; other living culture: CFCC 58821).

Notes. *Diaporthe diospyrina* and *D. diospyricola* were isolated from the same host genus *Diospyros* (Crous et al. 2013). Although *D. diospyricola* only has a sequence of the ITS locus, *D. diospyrina* can be distinguished from *D. diospyricola* by ITS (20/460). Morphologically, alpha conidia of *D. diospyrina* (7.5–9.0 µm) are longer than *D. diospyricola* (5.5–7.0 µm) (Crous et al. 2013). Therefore, the current two isolates (CFCC 58820 and 58821) were identified as a new species, *D. diospyrina*.

Diaporthe donglingensis **Y.K. Bai & X.L. Fan, Plant Pathol. 71: 1982 (2022).**

Description. See Bai et al. (2022).

Specimens examined. China, Beijing City, Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 40°0'54.47"N, 115°29'36.24"E, on twigs and branches of *Corylus heterophylla*, 13 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF202212148, cultures CFCC 58806 and 58807).

Notes. *Diaporthe donglingensis* was isolated from *Corylus heterophylla* in Beijing, China (Bai et al. 2022). Phylogenetically, isolates CFCC 58806 and 58807 clustered together with *D. donglingensis* with high statistical support (ML/BI = 100/1.00) (Fig. 1). Therefore, two isolates in this study were confirmed to be *D. donglingensis*.

Diaporthe eres **Nitschke, Pyrenomyc. Germ. 2: 245 (1870).**

Remark. Synonyms are listed in Hilário et al. (2021).

Description. See Udayanga et al. (2014).

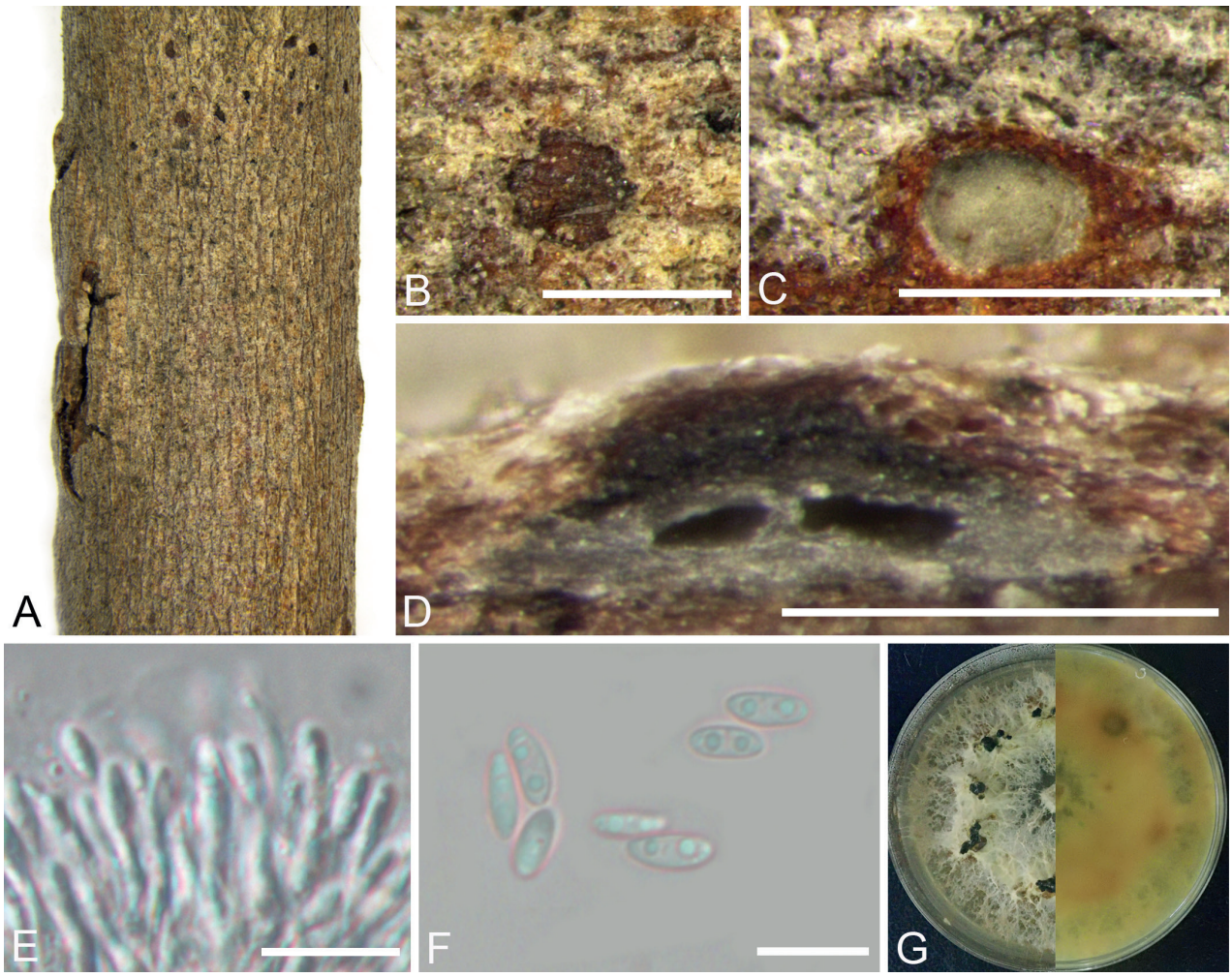

Figure 3. *Diaporthe diospyrina* from *Diospyros kaki* (BJFC CF202212147) **A, B** habit of conidiomata on branch **C** transverse section of conidioma **D** longitudinal section through conidioma **E** conidiophores and conidiogenous cells **F** alpha conidia **G** top (left) and bottom (right) sides of colonies on potato dextrose agar (PDA) after 30 days. Scale bars: 500 µm (**B, C**); 250 µm (**D**); 10 µm (**E, F**).

Specimens examined. China, Beijing City, Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 39°59'59.42"N, 115°29'47.36"E, on twigs and branches of *Populus* sp., 15 Jun. 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121411, cultures CFCC 58839 and 58840); Tongzhou District, 39°52'53.52"N, 116°43'45.35"E, on twigs and branches of *Acer palmatum*, 11 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121412, culture CFCC 58835); Tongzhou District, 39°52'53.25"N, 116°43'46.26"E, on twigs and branches of *Syringa oblata*, 11 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121413, culture CFCC 58836); Tongzhou District, 39°52'53.28"N, 116°43'46.35"E, on twigs and branches of *Pinus armandii*, 11 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121414, cultures CFCC 58841 and 58842); Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 40°0'59.47"N, 115°29'47.34"E, on twigs and branches of *Cotinus coggygria*, 15 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121415, culture CFCC 58837); Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 40°0'59.28"N, 115°29'47.44"E, on twigs and branches of *Platycladus orientalis*, 15 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121415, culture CFCC

58838); Mentougou District, Mountain Baihua, 39°59'54.38"N, 115°29'44.34"E, on twigs and branches of *Koelreuteria paniculata*, 15 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121416, culture CFCC 58833); Mentougou District, Mountain Baihua, 39°59'54.36"N, 115°29'44.35"E, on twigs and branches of *Forsythia suspensa*, 26 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121417, culture CFCC 58834); Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 39°59'59.31"N, 115°30'7.52"E, on twigs and branches of *Juglans mandshurica*, 15 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121418, culture CFCC 58845); Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 40°0'59.36"N, 115°29'47.57"E, on twigs and branches of *Pterocarya stenoptera*, 15 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121419, culture CFCC 58846); Fangshan District, Xiayunling National Forest Park, 39°44'35.32"N, 115°45'53.58"E, on twigs and branches of *Prunus salicina*, 23 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121420, cultures CFCC 58847 and 58848); Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 39°59'59.36"N, 115°29'47.57"E, on twigs and branches of *Ailanthus altissima*, 15 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121421, cultures CFCC 58831 and 58832); Mentougou District, Beijing Songshan National Nature Reserve, 40°30'18.55"N, 115°50'34.24"E, from branches of *Corylus heterophylla*, 17 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF202212146, cultures CFCC 58816 and 58817); Daxing District, Gusang National Forest Park, 39°38'48.25"N, 116°33'25.44"E, from branches of *Populus* sp., 6 Jun 2021, X.L. Fan & L. Lin (BJFC CF202212143, cultures CFCC 58818 and 58819); Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 40°0'16.22"N, 115°29'33.65"E, from branches of *Spiraea salicifolia*, 15 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF202212144, cultures CFCC 58826 and 58827).

Notes. *Diaporthe eres* was first described by Nitschke (1870) and isolated from *Ulmus* sp. in Germany. It is the most common species posing serious canker disease on diverse hosts (Gomes et al. 2013; Udayanga et al. 2014). In this study, 22 isolates were associated with canker diseases of 14 hosts genera including nine new host records in Beijing, China, which clustered in the *D. eres* species complex (Fig. 1). Therefore, these isolates were conformed to belong to *D. eres*, based on sequence data and morphology.

***Diaporthe rostrata* C.M. Tian, X.L. Fan & K.D. Hyde, Mycol. Prog. 14: 82 (2015).**

Remark. Synonym is listed in Zhu et al. (2019).

Description. See Fan et al. (2015).

Specimens examined. China, Beijing City, Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 39°59'59.52"N, 115°29'47.26"E, on twigs and branches of *Juglans mandshurica*, 15 Jun 2022, Y.K. Bai & X.L. Fan (BJFC CF2022121410, cultures CFCC 58843 and 58844).

Notes. *Diaporthe rostrata* was described as being associated with walnut dieback of *Juglans mandshurica* in China (Fan et al. 2015). The common symptom of this species was rostrate host tissue around the necks on infected branches (Fan et al. 2015). The current two isolates (CFCC 58843 and 58844) were identified as *D. rostrata* according to forming a fully supported clade with sequences from CFCC 50062, the ex-type of *D. rostrata* (ML/BI = 100/1.00).

Diaporthe ulmina **Y.K. Bai & X.L. Fan, sp. nov.**
MycoBank No: 847184
Fig. 4

Etymology. Named after the host genus on which it was collected, *Ulmus*.

Description. Sexual morph: Ascostromata immersed in bark, erumpent, with 3–4 perithecial in black entostromata, conceptacle absent, 300–600 µm diam. Perithecia black, scattered, arranged circularly, ovoid to spherical, 250–380 µm (av. = 310 ± 30 µm, n = 30) diam. Asci 8-spored, unitunicate, clavate to cylindrical, sessile, 37–43 × 4.5–7 µm (av. = 40 ± 1.5 × 5.6 ± 0.5 µm, n = 50). Ascospores fusoid, hyaline, 2–4 guttulate, smooth-walled, 9–11 × 2–3.5 µm (av. = 9.9 ± 0.4 × 2.8 ± 0.4 µm, n = 50), L/W = 3–4 (av. = 3.4 ± 0.2, n = 50). Asexual morph not observed.

Culture characteristics. Cultures with felty aerial mycelium are initially white, growing slowly and entirely covering the 9 cm Petri dish after 8 days,

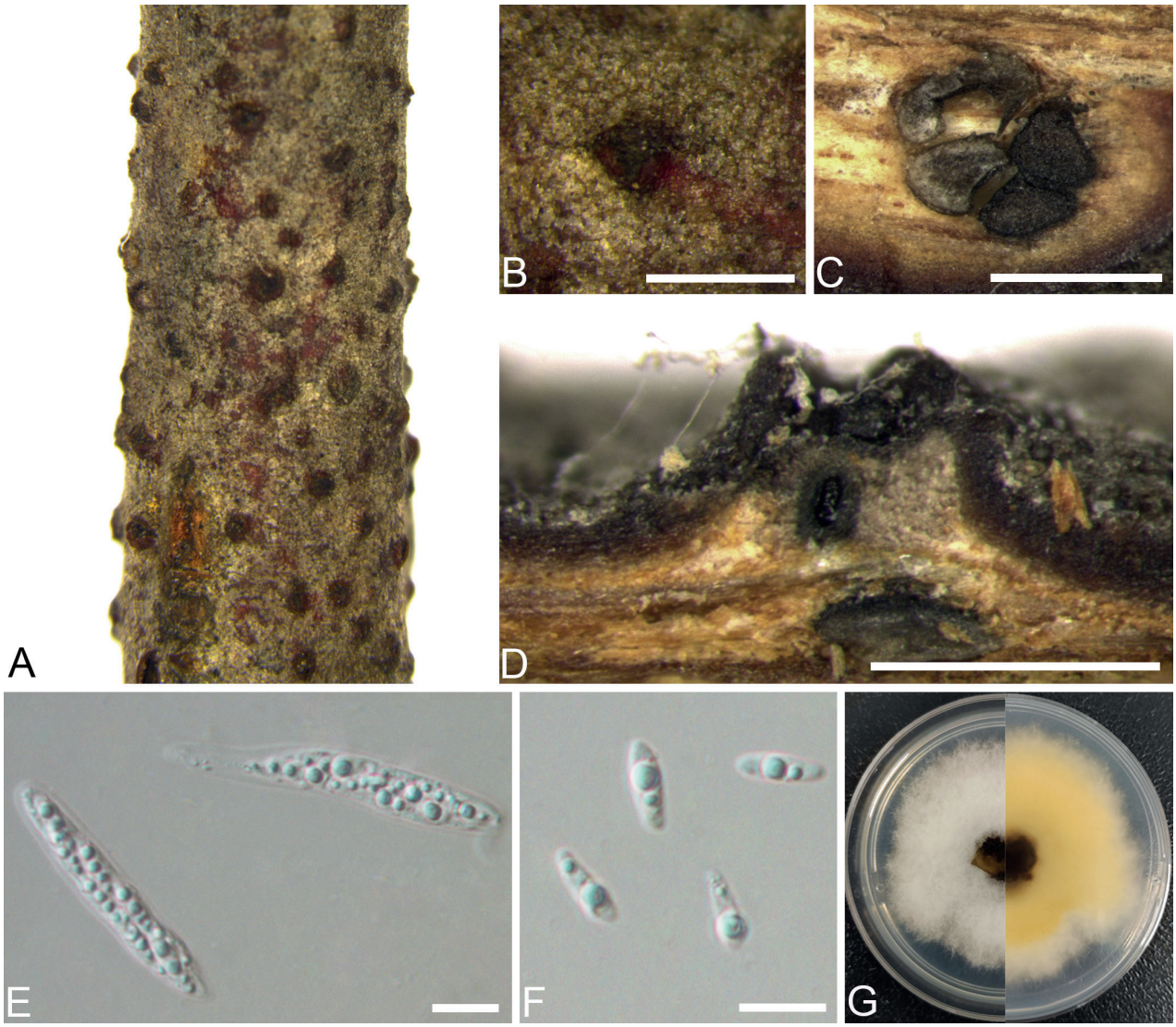

Figure 4. *Diaporthe ulmina* from *Ulmus pumila* (BJFC CF202212142) **A, B** habit of ascomata on branch **C** transverse section through ascomata **D** longitudinal section through ascomata **E** asci **F** ascospores **G** top (left) and bottom (right) sides of colonies on potato dextrose agar (PDA) after 7 days. Scale bars: 500 µm (**B–D**); 10 µm (**E, F**).

felty with a uniform texture and regular edge. Conidiomata were not observed until 30 days.

Specimens examined. China, Beijing, Mentougou District, Mountain Dongling, Xiaolongmen Forestry Centre, 39°58'19.65"N, 113°12'39.24"E, from branches of *Ulmus pumila*, 16 Jun 2022, Y.K. Bai & X.L. Fan (holotype BJFC CF202212142, ex-type living culture: CFCC 58828; other living culture: CFCC 58829; *ibid*. BJFC CF2022121423, culture CFCC 58830).

Notes. *Diaporthe ulmina* is associated with canker disease of *Ulmus pumila*. In this study, the isolates CFCC 58828 and 58829 formed a single-lineage clade with high support values (ML/BI = 100/1.00) and it appears to be most closely related to *D. huairouensis* (Fig. 1). *Diaporthe ulmina* differs from *D. huairouensis* isolated from *Corylus heterophylla* by host association (Bai et al. 2022). Phylogenetically, *D. ulmina* can be distinguished from *D. huairouensis* by base differences as follows: 16/466 for ITS, 4/420 for *cal*, 17/473 for *his3*, 34/329 for *tef1-α* and 10/420 for *tub2* (Bai et al. 2022). Therefore, *D. ulmina* is described as a new species.

Discussion

The current study described three new species (*D. changpingensis*, *D. diospyrina* and *D. ulmina*) and four known species (*D. corylicola*, *D. donglingensis*, *D. eres* and *D. rostrata*), based on 35 isolates of *Diaporthe* in Beijing, China. The results indicate that *Diaporthe* species in Beijing are diverse and logical disease control strategies are required.

Since modern taxonomy approaches were applied, more than 40 novel species have been introduced in the recent five years (Fan et al. 2018b; Yang et al. 2018; Dissanayake et al. 2020; Guo et al. 2020; Hilário et al. 2020; Gao et al. 2021; Huang et al. 2021; Jiang et al. 2021b; Bai et al. 2022; Cao et al. 2022). Warmer climate and extensive application of chemicals in fungicides may lead to emergence of new species that are more resistant in northern China (Piao et al. 2010; Úrbez-Torres 2011; Manawasinghe et al. 2018; Jiang et al. 2022a, b). *Diaporthe* species pose a significant challenge to disease control due to their high species diversity and outstanding environmental adaptation.

Taxonomic identification of the *Diaporthe* species complexes is challenging. Norphanphoun et al. (2022) introduced 13 species complexes (*D. alnea*, *D. arecae*, *D. biconispora*, *D. carpini*, *D. decedens*, *D. oncostoma*, *D. pustulata*, *D. rudis*, *D. scobina*, *D. sojae*, *D. toxica*, *D. varians* and *D. vawdreyi*) to make the identification of *Diaporthe* species easier. The current phylogenetic analysis revealed that *D. donglingensis* clustered between the *D. decedens* and *D. oncostoma* complexes and the remaining isolates clustered in the *D. alnea*, *D. arecae*, *D. carpini*, *D. decedens* and *D. oncostoma* complexes (Fig. 1), of which the *D. alnea* complex was controversial. *Diaporthe eres* was extensively studied and described as a complex by Udayanga et al. (2014). Fan et al. (2018b) treated four species (*D. biguttusis*, *D. ellipicola*, *D. longicolla* and *D. mahothocarpus*) as synonyms of the *D. eres* complex using a three genes matrix (*cal*, *tef1-α* and *tub2*). Then Hilário et al. (2021) treated 31 species in the *D. eres* complex as one species, based on the GCPSR principle and the coalescent-based species model (PTP). Currently, *D. eres* is included in the *D. alnea* complex by Norphanphoun et al. (2022). *Diaporthe alnea* was used to describe it because *D. alnea*

was the oldest name that was introduced in 1867 (Fuckel 1867). However, most of the species in this complex have been treated as synonyms of *D. eres* and *D. eres* was used most often in the past (Hilário et al. 2021). Therefore, we suggest using *D. eres* to describe this complex to make communication easier. In this study, we considered *D. eres* as a single species following Hilário et al. (2021). The largest isolation rate of *D. eres* (62.86%) revealed this species to be the most prevalent species in Beijing, which is consistent with Bai et al. (2015). As an important pathogen, it has a wide range of hosts, especially hosts in Rosaceae (https://nt.ars-grin.gov/fungaldatabases; accessed on 23 Mar 2023). In this study, *D. eres* were reported on 14 hosts including nine new hosts (*Ailanthus altissima*, *Cotinus coggygria*, *Forsythia suspensa*, *Koelreuteria paniculata*, *Pinus armandii*, *Platycladus orientalis*, *Prunus salicina*, *Pterocarya stenoptera* and *Syringa oblata*). The pathogenicity of *D. eres* on these hosts should be evaluated in further studies.

Hazelnuts and walnuts are important plants for ecological forestation and economy and are suffering from various fungal pathogens. Over 40 species of fungi occurring on *Corylus* have been recorded in the Fungal database (https://nt.ars-grin.gov/fungaldatabases; accessed on 23 Mar 2023). *Diaporthe eres* is the main cause of hazelnut defects in the Caucasus Region (Battilani et al. 2018). In this study, we accepted three species (*D. corylicola*, *D. donglingensis* and *D. eres*) inhabiting hazelnuts, of which *D. corylicola* was reported as the main species isolated form *Corylus* in Beijing (Gao et al. 2021). The comparisons show that the occurrence of *Diaporthe* species may associate with geographical and environmental factors. The distribution of *Diaporthe* species requires further studies. In terms of walnut, three species (*D. eres*, *D. rostrata* and *D. tibetensis*) have been reported causing canker disease in *Juglans* in China (Fan et al. 2015, 2018b). However, this study accepted *D. eres* and *D. rostrata* inhabiting *Juglans* in the present study in Beijing. These results proved that *Corylus* and *Juglans* could be infected by diverse species of *Diaporthe*. These fungi have become one of the main threats to hosts and pose serious environmental burdens. Therefore, preventative measures are required to control the diseases caused by *Diaporthe* species.

Most *Diaporthe* species occur on a wide host range, especially *D. eres* (Gomes et al. 2013). However, some of the species seem to be limited to a single host species in the current study. For example, *D. rostrata* is associated with canker diseases of *Juglans mandshurica*, which is consistent with the results of Zhu et al. (2019). Therefore, extensive sampling should be constructed in the future to better understand the host association of *Diaporthe* species.

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Additional information

Conflict of interest

The authors declare that they have no competing interests.

Ethical statement

No ethical statement was reported.

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No funding was reported.

Author contributions

Conceptualization: XF, YB. Formal analysis: LL, YB. Funding acquisition: XF. Investigation: LL, XF, YB. Methodology: LL, YB. Resources: LL, YB, XF. Software: YB, XF. Supervision: XF. Validation: YB, MP. Visualization: YB. Writing - original draft: YB. Writing - review and editing: XF, LL, MP.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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