



Synnemasporellaceae: A New Family Record for Turkish Ascomycota

Makbule ERDOĞDU¹, Gökhan DOĞAN², Ilgaz AKATA³, Zekiye SULUDERE⁴

¹Ahi Evran University, Faculty of Agriculture, Department of Landscape Architects, Kırşehir, ²Ahi Evran University, Graduate School of Natural and Applied Sciences, Kırşehir, ³Ankara University, Faculty of Science, Department of Biology, Ankara, ⁴Gazi University, Faculty of Science, Department of Biology, Teknikokullar, Ankara, TURKEY

¹<https://orcid.org/0000-0001-8255-2041>, ² <https://orcid.org/0000-0002-9766-3534>, ³ <https://orcid.org/0000-0002-1731-1302>

⁴<https://orcid.org/0000-0002-1207-5814>

✉: merdogdu@ahievran.edu.tr

ABSTRACT

The current study was carried out based on fungi specimens collected from *Rhus coriaria* in Bolu province in July 2018. As a result of field and laboratory studies, *Synnemasporella aculeans* (Schwein.) X.L. Fan & J.D.P. Bezerra (*Synnemasporellaceae*) was reported for the first time from Turkey at species, genus and family level and *Rhus coriaria* was represented as a new host species for *S. aculeans*. Description of this species was provided together with its photographs and scanning electron microscope (SEM) images related to macro and micromorphologies and discussed briefly.

Research Article

Article History

Geliş Tarihi : 19.07.2020

Kabul Tarihi : 01.09.2020

Keywords

Ascomycota

Synnemasporella aculeans

New record

New host

SEM

Synnemasporellaceae: Türkiye Askomisetleri İçin Yeni Bir Familya Kaydı

ÖZET

Bu çalışma, Temmuz 2018' de Bolu ilinde *Rhus coriaria* üzerinden toplanan mantar örneklerine dayanarak gerçekleştirilmiştir. Arazi ve laboratuvar çalışmaları sonucunda, *Synnemasporella aculeans* (Schwein.) X.L. Fan & J.D.P. Bezerra (*Synnemasporellaceae*) tür, cins ve familya seviyesinde Türkiye'den ilk kez rapor edilmiştir ve *Rhus coriaria*, *S. aculeans* için yeni bir konakçı kayıdır. Bu türün betimlemesi, makro ve mikromorfolojilerine ait fotoğraflar ve tarama elektron mikroskopu (SEM) görüntüleri ile birlikte sağlanmış ve kısaca tartışılmıştır.

Araştırma Makalesi

Makale Tarihçesi

Received : 19.07.2020

Accepted : 01.09.2020

Anahtar Kelimeler

Ascomycota

Synnemasporella aculeans

Yeni kayıt

Yeni konukçu

SEM

To Cite : Erdoğan M, Doğan G, Akata I, Suludere Z 2021. *Synnemasporellaceae*: A New Family Record for Turkish Ascomycota. KSU J. Agric Nat 24 (2): 425-429. <https://doi.org/10.18016/ksutarimdog.vi.770648>.

INTRODUCTION

Diaporthales is an order of the class *Sordariomycetes* within the division *Ascomycota* and it contains over 1250 species belonging to 186 genera and 29 families (Wijayawardene et al., 2020). Members of the order, also known as diaporthalean fungi, are saprobes, endophytes or pathogens of many plants and characterized by dark perithecia immersed in a stroma or the substrata, absence of true paraphyses at maturity, and unitunicate asci that float free within the centrum at maturity and having a characteristic refractive ring in the ascus apex (Barr, 1978; Samuels and Blackwell, 2001). Asexual morphs of the order are usually coelomycetous, producing phialidic, often annellidic conidiogenesis, and generally non- or 1-septate conidia in pycnidia or acervuli with or without stromata (Rossman et al., 2007).

Synnemasporellaceae, a small family in the order

Diaporthales, was established in 2018 based on both morphological and the analysis of partial ITS, LSU, rpb2 and tef1- α gene sequences. It is represented by the single genus *Synnemasporella* and two currently exist species (*S. aculeans* (Schwein.) X.L. Fan & J.D.P. Bezerra and *S. toxicodendri* X.L. Fan & J.D.P. Bezerra). The presence of long-necked perithecia, clavate asci, fusoid-ellipsoid, 1-septate, hyaline ascospores, usually with a short, hyaline, bristle-like appendage at both ends, and synnematal and/or pycnidial conidiomata producing smooth, cylindrical to clavate, and pale brown conidia are characteristic features of members of the family (Fan et al., 2018).

S. aculeans was proposed as a new combination in the new genus *Synnemasporella* based on the description of *Cryptodiaporthe aculeans* (Schwein.) Wehm. (Fan et al., 2018), characterised by perithecial ascomata, and an asexual morph producing sporodochial and/or pycnidial conidiomata (Wehmeyer, 1933). The species

represents two kinds of conidiomata, namely pycnidia and synnemata (Wehmeyer, 1933).

According to literature on Turkish diaporthelean fungi (Akgül et al., 2014; 2015; Stoykov, 2016), there was not any report related to the family *Synnemasporellaceae* in Turkey. This study aims to introduce a new family for Turkish diaporthelean fungi.

MATERIALS and METHODS

Synnemasporella specimens were collected from Bolu province of Turkey. Host plant were identified using the Flora of Turkey and East Aegean Islands (Davis 1967). Thin fungal sections prepared from host tissue were examined under a Leica DM E light microscope and measured from mounts in tap water. Infected host surfaces were photographed using a Leica EZ4D stereomicroscope. For scanning electron microscopy (SEM), infected branches were mounted on stubs with double-sided tapes. They were coated with gold in Polaron SC 502 Sputter Coater and examined with Jeol JSM 6060 SEM at 5–10 kV in the Faculty of Science, Gazi University, Ankara, Turkey. *S. aculeans* was identified using relevant literature (Wehmeyer, 1933; Fan et al., 2018). All examined specimens are deposited into the Kırşehir Ahi Evran University, Faculty of Agriculture, Kırşehir, Turkey.

RESULTS

Description, host plant, habitat, locality, collection date, voucher number, distribution, microphotographs of the species were arranged below according to the systematics given in Index Fungorum (2020). All descriptions are based on the Turkish specimens.

Fungi

Ascomycota Caval.-Sm.

Sordariomycetes O.E. Erikss. & Winka

Diaporthales Nannf.

Synnemasporellaceae X.L. Fan & J.D.P. Bezerra

Synnemasporella X.L. Fan & J.D.P. Bezerra

Synnemasporella aculeans (Schwein.) X.L. Fan & J.D.P. Bezerra

Sexual and asexual morph (synnematal) were found together on branches of *Rhus coriaria* L. Pycnidial conidiomata was not observed in the this specimen.

Sexual morph: Pseudostroma at first immersed in host tissue, later erumpent with large dense fascicles of elongate-cylindrical ostioles, 0.5–3 mm diam, covered by a whitish pulverulence. Stromatic areas are absent. Perithecia spherical or flattened, 100–350 µm diam., brown; necks elongate-cylindrical, 400–970 × 100–230, grayish to black. Asci 8-spored, unitunicate, clavate, 58–65 × 9–12 µm. Ascospores biseriate, fusiform-cylindrical, straight or slightly curved, attenuate at both ends, 1-septate, septum median, constricted at the septum, 14–20 × 4–5 µm, guttulate, hyaline, ends bearing a small, bristle-like, 1.5-2 µm long, hyaline

appendage (Figure 1).

Asexual morph: Conidiomata synnematal. Synnemata immersed in host tissue, later becoming erumpent, long, determinated, straight to curved, single or branched at the base, with convex and black conidiogenous cells zone, 770–1710 × 280–540 µm, grayish to black. Conidiophores straight to curved, aggregated, aseptate, 18–40 × 1.5–2 µm, hyaline. Conidiogenous cells cylindrical, straight to curved, aggregated, hyaline. Conidia ellipsoid, oblong to subcylindrical, one-celled, smooth, with a not distinct hilum, guttulate, 8–11 × 3–3.8 (–4.2) µm, pale brown (Figure 2).

Material examined: Turkey–Bolu, Bağışlar Village, on branches of *Rhus coriaria* L. (Anacardiaceae), 40°50'48"N, 31°45'12"E, 1012 m asl, 22.07.2018, in forest, GD 1499.

Distribution: On *Rhus chinensis* in China (Fan et al., 2018; Jiang et al., 2019), on *Rhus copallina* and *Rhus glabra* in Georgia (Hanlin, 1963), on *Rhus javanica* and *Rhus javanica* var. *roxburghii* in Japan (Kobayashi, 1970; Otani, 1995), on *Rhus copallina*, *Rhus diversiloba*, *Rhus glabra*, *Rhus typhina* and *Rhus vernix* in USA (Farr and Rossman, 2020).

DISCUSSION

S. aculeans resembles *S. toxicodendri* in terms of morphology but the former species can easily be separated from the latter by having shorter synnemata, a convex conidiogenous cells zone at the apex of synnemata, and larger, oblong-cylindrical conidia (Fan et al., 2018).

The Turkish samples are compatible with other reports of *S. aculeans* in pseudostroma, asci, ascospores, synnemata and conidia morphology. The only observable differences being the larger dimensions of pseudostroma, asci, ascospores and synnemata. Wehmeyer (1933) described 0.3–1 mm diam. pseudostroma, 47–65 × 5–8 µm asci, 14–20 × 4–5 µm ascospores. Fan et al. (2018) described 1100–1500 × 200–400 µm synnemata and conidia with a distinct hilum. We have observed that the hilum in conidia is not distinct in the Turkish specimen.

With this study, *S. aculeans* was reported for the first time from Turkey at species, genus and family level. Additionally, *R. coriaria* was recorded as a new host species for *S. aculeans*.

ACKNOWLEDGMENTS

The authors would like to thank Prof. Dr. Zeki AYTAÇ for his valuable effort on the identification of the host plants.

Statement of Conflict of Interest

Authors have declared no conflict of interest.

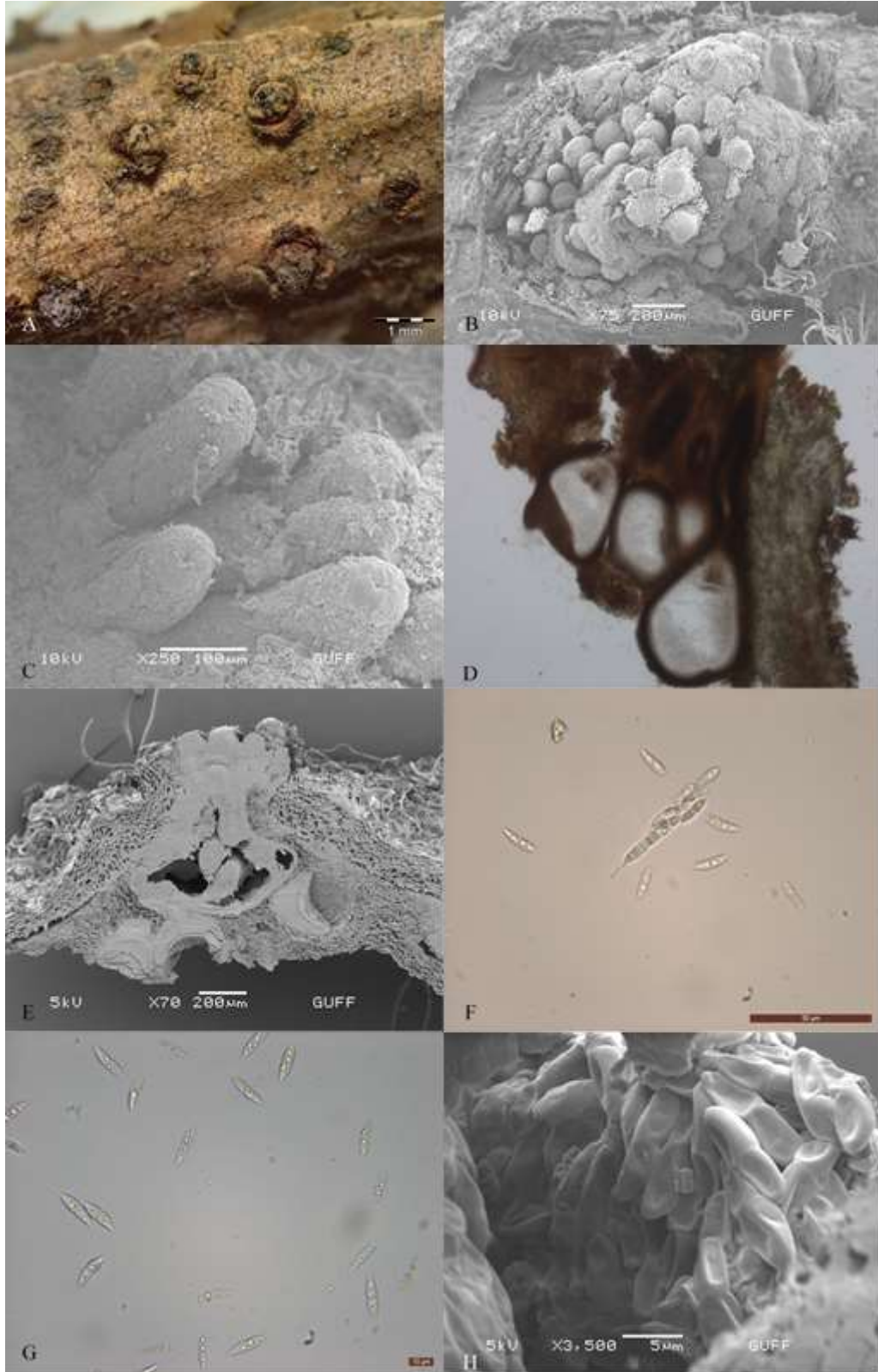


Figure 1. *Synnemaspora aculeans*: a. pseudostroma, b, c. pseudostroma (SEM), d. longitudinal section through pseudostroma, e. longitudinal section through pseudostroma (SEM), f. ascus and ascospores, g. ascospores, h. ascospores (SEM).

Şekil 1. *Synnemaspora aculeans*: a. pseudostroma, b, c. pseudostroma (SEM), d. pseudostromadan boyuna kesit, e. pseudostromadan boyuna kesit (SEM), f. askus ve askosporlar, (G) askosporlar, (H) askosporlar (SEM).

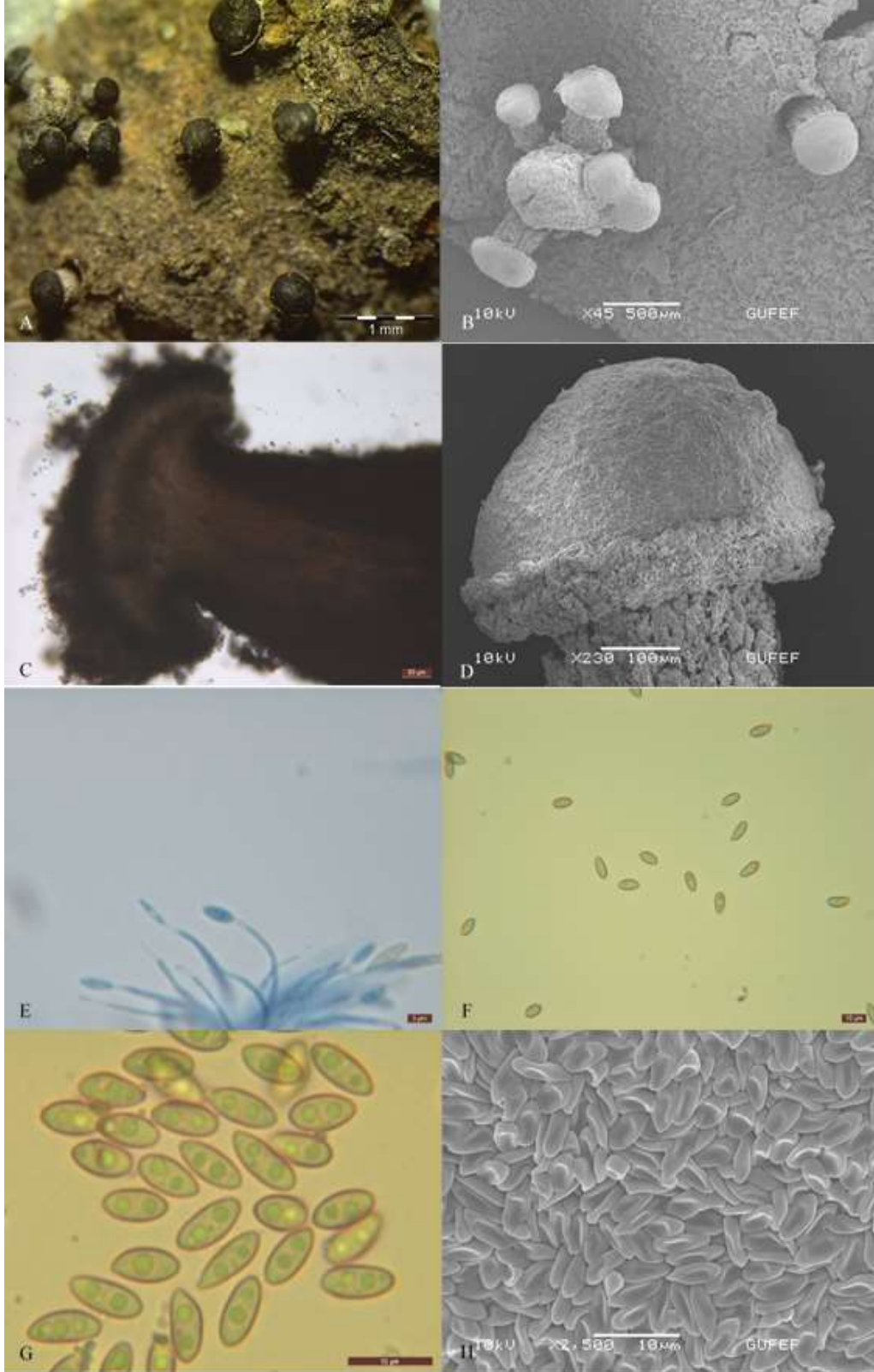


Figure 2. *Synnemasporella aculeans*: a. synnemata, b. synnemata (SEM), c. longitudinal section through synnema, d. convex conidiogenous cells zone (SEM), e. conidiophores and conidiogenous cells, f, g. conidia, h. conidia (SEM).

Şekil 2. *Synnemasporella aculeans*: a. sinnemalar, b. sinnemalar (SEM), c. sinnemadan boyuna kesit, d. konveks konidiojen hücre zonu (SEM), e. konidioforlar ve konidiojen hücreler f, g. konidiumlar, h. konidiumlar (SEM).

Author's Contributions

The contribution of the authors is equal.

REFERENCES

- Akgül DS, Mayorquin JS, Eskalen A 2014. First Report of *Diaporthe neoviticola* Associated with Wood Cankers of Grapevine in Turkey. *Plant Disease* 98(5): 692-692.
- Akgul H, Ergul CC, Yilmazkaya D, Akata I, Selçuk F, Huseyin E 2015. Diversity of Microfungi on Fagaceae in Uludag Forests. *Oxidation Communications* 38(3): 1529-1538.
- Barr ME 1978. The Diaporthales in North America with Emphasis on *Gnomonia* and Its Segregates. *Mycologia Memoir* 7: 1-232.
- Davis PH (ed.) 1967. Flora of Turkey and East Aegean Islands. Vol. 2. Edinburgh University Press, Edinburgh, 581 pp.
- Fan XL, Bezerra JD, Tian CM, Crous PW 2018. Families and Genera of Diaporthalean Fungi Associated with Canker and Dieback of Tree Hosts. *Persoonia* 40: 119-134.
- Farr DF, Rossman AY 2020. Fungal databases. U.S. National Fungus Collections, Website <https://nt.ars-grin.gov/fungaldatabases/> [Accessed 30 June 2020].
- Hanlin RT 1963. A revision of the Ascomycetes of Georgia. Georgia Agricultural Experiment Stations, University of Georgia, College of Agriculture, 175: 1-65.
- Index Fungorum 2020. Website <http://www.indexfungorum.org/Names/Names.asp>. [Accessed 30 June 2020].
- Jiang N, Yang Q, Liang Y-M, Tian C 2019. Taxonomy of Two Synnematal Fungal Species from *Rhus chinensis*, with *Flavignomonium* gen. nov. Described. *Mycosphere* 60: 17-29.
- Kobayashi T 1970. Taxonomic Studies of Japanese Diaporthaceae with Special Reference to Their Life-Histories. *Bulletin of the Government Forest Experiment Station*, 226: 1-242.
- Otani Y 1995. *Mycological Flora of Japan*. Tokyo: Yokendo Ltd., 3: 310.
- Rossman AY, Farr DF, Castlebury LA 2007. A Review of the Phylogeny and Biology of the Diaporthales. *Mycoscience* 48: 135-144.
- Samuels GJ, Blackwell M 2001. Pyrenomycetes — Fungi with Perithecia (The Mycota-Systematics and Evolution VII part A. Springer, Verlag: Eds. McLaughlin DL, McLaughlin EG, Lemke PA) 221-255.
- Stoykov DY 2016. New Records of *Ophiognomonium* (Gnomoniaceae, Diaporthales) from Bulgaria, Greece and Turkey. *Phytologia Balcanica* 22(3): 297-301.
- Wehmeyer LE 1933. The Genus *Diaporthe Nitschke* and Its Segregates. University of Michigan, USA, 349 pp.
- Wijayawardene NN, Hyde KD, Al-Ani LKT, Tedersoo L, Haelewaters D, Rajeshkumar KC, Zhao RL, Aptroot A, Leontyev DV, Saxena RK, Tokarev YS, Dai DQ, Letcher PM, Stephenson SL, Ertz D, Lumbsch HT, Kukwa M, Issi IV, Madrid H, Phillips AJL, Selbmann L, Pfliegler WP, Horváth E, Bensch K, Kirk PM, Kolaříková K, Raja HA, Radek R, Papp V, Dima B, Ma J, Malosso E, Takamatsu S, Rambold G, Gannibal PB, Triebel D, Gautam AK, Avasthi S, Suetrong S, Timdal E, Fryar SC, Delgado G, Réblová M, Doilom M, Dolatabadi S, Pawłowska JZ, Humber RA, Kodsueb R, Sánchez-Castro I, Goto BT, Silva DKA, de Souza FA, Oehl F, da Silva GA, Silva IR, Błaszowski J, Jobim K, Maia LC, Barbosa FR, Fiuza PO, Divakar PK, Shenoy BD, Castañeda-Ruiz RF, Somrithipol S, Lateef AA, Karunarathna SC, Tibpromma S, Mortimer PE, Wanasinghe DN, Phookamsak R, Xu J, Wang Y, Tian F, Alvarado P, Li DW, Kušan I, Matočec N, Mešić A, Tkalčec Z, Maharachchikumbura SSN, Papizadeh M, Heredia G, Wartchow F, Bakhshi M, Boehm E, Youssef N, Hustad VP, Lawrey JD, Santiago ALCMA, Bezerra JDP, Souza-Motta CM, Firmino AL, Tian Q, Houbraken J, Hongsanan S, Tanaka K, Dissanayake AJ, Monteiro JS, Grossart HP, Suija A, Weerakoon G, Etayo J, Tsurukau A, Vázquez V, Mungai P, Damm U, Li QR, Zhang H, Boonmee S, Lu YZ, Becerra AG, Kendrick B, Brearley FQ, Motiejūnaitė J, Sharma B, Khare R, Gaikwad S, Wijesundara DSA, Tang LZ, He MQ, Flakus A, Rodriguez-Flakus P, Zhurbenko MP, McKenzie EHC, Stadler M, Bhat DJ, Liu JK, Raza M, Jeewon R, Nassonova ES, Prieto M, Jayalal RGU, Erdoğdu M, Yurkov A, Schnittler M, Shchepin ON, Novozhilov YK, Silva-Filho AGS, Gentekaki E, Liu P, Cavender JC, Kang Y, Mohammad S, Zhang LF, Xu RF, Li YM, Dayarathne MC, Ekanayaka AH, Wen TC, Deng CY, Pereira OL, Navathe S, Hawksworth DL, Fan XL, Dissanayake LS, Kuhnert E, Grossart P, Thines M 2020. Outline of Fungi and Fungus-Like Taxa. *Mycosphere* 11(1): 1060-1456.