

Two new thermophilic species of *Myceliophthora* (Ascomycota: Sordariales) from soil and compost piles

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INTRODUCTION

The anamorphic genus *Myceliophthora* sp. is characterized by solitary conidia with narrow basal attachments sometimes borne on ampulliform swellings [1, 2]. Most species in the genus are thermotolerant or thermophilic and exhibit cellulolytic activity [3]. Teleomorphs belong in the sordariaceous genus *Corynascus*. During a survey of thermophilic fungi aiming to explore their enzymes for biotechnological applications, four isolates were found to belong to the genus *Myceliophthora*. Initially, the isolates were identified as *Myceliophthora thermophila* according to morphological characteristics, but latter were shown to be new taxa according to molecular markers. Here, we propose two new species of *Myceliophthora* to accommodate such isolates.

MATERIAL AND METHODS



Compost piles
Olímpia, SP.



Cultivated soil
Ubarana, SP.

Isolation → Characterization

Morphological

Macro and micromorphology of isolates were observed on cultures grown on MA 2% and PDA at 45° C.

Radial growth was determined on MEA, OA, PCA and PDA at 25 36 and 45° C.

Molecular



Amplification of ITS rDNA and D1/D2 26S rDNA coupled with Sanger sequencing

BLAST_N NCBI-GenBank
Phylogenetic analysis
PAUP* v.4.b10

RESULTS AND DISCUSSION

1. *Myceliophthora olimpiensis* Rodrigues, Moretti, Bonugli-Santos, Gomes & Sette, sp. nov. (Figure 1a-c)

Teleomorph: unknown

Type: **Brasil:** Olímpia-SP, ex compost pile, 04/24/09, M. Moretti (M.7.7.)

Remarks: Colonies growing rapidly, attaining 9 cm diameter in PCA after 3 days at 45° C (Table 1). On PDA and MA2% colonies plane initially white, later pale brown, reverse uncolored. Hyphae septate, hyaline, 5.08 µm in diameter. Conidiophores branched. Conidia clavate or obovoid, with truncate base, sessile or on ampulliform swellings (sometimes in chains), smooth walled, 5.65-7.91 x 3.39-4.52 µm.

2. *Myceliophthora ubaranaensis* Rodrigues, Moretti, Bonugli-Santos, Gomes & Sette, sp. nov. (Figure 1 d-f)

Teleomorph: unknown

Type: **Brasil:** Ubarana-SP, ex cultivated soil, 05/14/09, M. Moretti (F.2.1.4.)

Remarks: Colonies growing rapidly, attaining 9 cm diameter in MEA after 3 days at 45° C (Table 1). On PDA and MA2% colonies floccose initially white, later pale brown, reverse uncolored. Hyphae septate, hyaline, 6.0 µm in diameter. Conidiophores branched. Conidia ellipsoid or obovoid, with truncate base, sessile or on ampulliform swellings (sometimes in chains), walls smooth to verrucose, 5.0-6.41 x 3.39-4.52 µm.

Table 2. BLAST_N results of D1/D2 26S rDNA and ITS rDNA of *Myceliophthora* isolates

Isolate	D1/D2 26S rDNA			ITS		
	length	%	GenBank closest relative	length	%	GenBank closest relative
M7.7	462	100	<i>Corynascus sepedonium</i> FMR9123 (FJ666364)	457	99	<i>Myceliophthora</i> sp. T41 (FJ548836)
F.2.1.1	508	98	<i>Corynascus sepedonium</i> FMR9123 (FJ666364)	477	99	<i>Myceliophthora</i> sp. T31 (FJ548837)
F.2.1.3	518	98	<i>Corynascus sepedonium</i> FMR9123 (FJ666364)	415	100	<i>Myceliophthora</i> sp. T31 (FJ548837)
F.2.1.4	491	99	<i>Corynascus sepedonium</i> FMR9123 (FJ666364)	492	99	<i>Myceliophthora</i> sp. T31 (FJ548837)

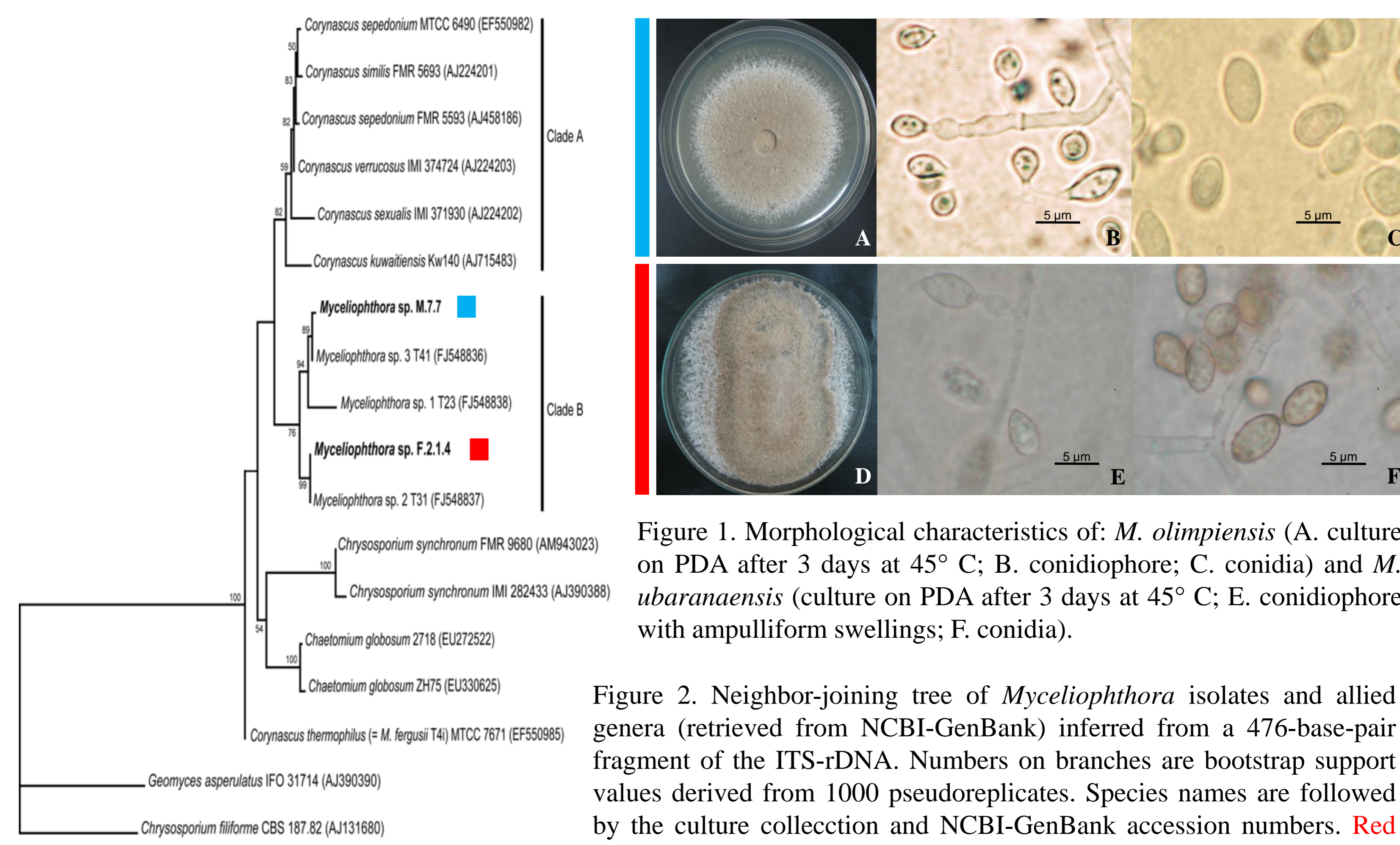


Figure 1. Morphological characteristics of: *M. olimpiensis* (A. culture on PDA after 3 days at 45° C; B. conidiophore; C. conidia) and *M. ubaranaensis* (culture on PDA after 3 days at 45° C; E. conidiophore with ampulliform swellings; F. conidia).

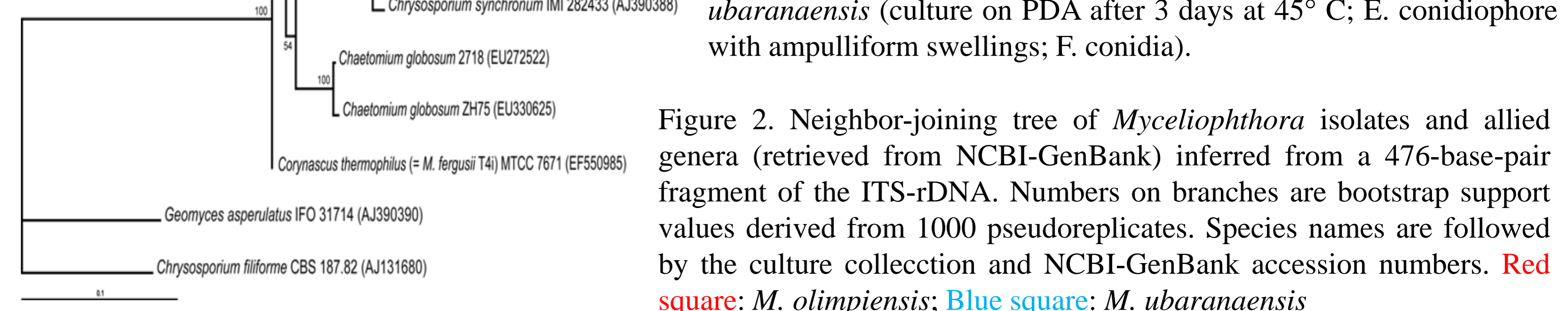


Figure 2. Neighbor-joining tree of *Myceliophthora* isolates and allied genera (retrieved from NCBI-GenBank) inferred from a 476-base-pair fragment of the ITS-rDNA. Numbers on branches are bootstrap support values derived from 1000 pseudoreplicates. Species names are followed by the culture collection and NCBI-GenBank accession numbers. Red square: *M. olimpiensis*; Blue square: *M. ubaranaensis*

Table 1. Radial growth diameters of *Myceliophthora* spp. on different culture media and temperatures

Isolate	Media	Temperature (° C)		
		25	36	45
<i>Myceliophthora olimpiensis</i>	MEA	6,83 ± 0,40	34,81 ± 1,94	78,16 ± 2,22
	OA	6,16 ± 0,75	26,83 ± 1,32	75,16 ± 1,94
	PCA	5,33 ± 1,21	30,00 ± 0,63	90,00 ± 0,00
	PDA	3,83 ± 0,75	30,66 ± 0,81	70,50 ± 5,08
<i>Myceliophthora ubaranaensis</i>	MEA	5,16 ± 0,75	32,00 ± 1,89	90,00 ± 0,00
	OA	5,00 ± 1,54	25,83 ± 1,60	75,00 ± 7,64
	PCA	4,50 ± 0,54	21,33 ± 1,03	62,33 ± 2,06
	PDA	3,16 ± 1,16	25,16 ± 0,75	71,83 ± 3,60

Phylogenetic analysis using ITS-rDNA gene sequences indicated that isolates M7.7. and F.2.1.4 are undescribed taxa (Table 2, Figure 2). Similar to other species in the genus, isolate M.7.7 produced cellulase (53.7 U.g⁻¹ of substrate) in addition to proteases (1.78 U.mL⁻¹). The putative new species formed a sister clade with *Corynascus* sp. which is known for its *Myceliophthora* sp. anamorphs (Figure 2).

REFERENCES

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