

# Botryosphaeriaceae associated with exotic *Sequoiadendron giganteum* trees in botanical gardens, arboreta and parks of Zagreb

Short Term Scientific Mission (STSM), COST Action FP1401

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## Summary

Species of the Botryosphaeriaceae (Ascomycota: Botryosphaeriales) are distributed in temperate and tropical climates worldwide and occur on a large variety of plant hosts, including giant Sequoia (*Sequoiadendron giganteum* (Lindl.) J. Buchholz) trees. Since the majority of Botryosphaeriaceae are generalist pathogens that can easily cross-infect other nearby tree species, it is important to further examine the dieback of *S. giganteum* trees possibly caused by Botryosphaeriaceae species in botanical gardens, parks and arboreta of Zagreb, Croatia. The aim of this STSM was to isolate and identify (up to the family level) Botryosphaeriaceae associated with the dieback of those trees.

Sampling of diseased *S. giganteum* trees was done in March 2017. Samples were collected from nine symptomatic trees and one asymptomatic tree planted in a botanical garden, arboretum and various parks across the city. Symptomatic samples (shoots and branches experiencing dieback, necrotic lesions, cankers and resin flow) and asymptomatic pieces of shoots and needles surrounding diseased parts were collected, placed in paper bags and brought to Belgrade for further examination. Botryosphaeriaceae-like isolates were identified up to the family level by using morphology of fungal cultures.

In total, 145 Botryosphaeriaceae-like isolates were obtained from diseased *S. giganteum* trees (Table 1). The Botryosphaeriaceae were isolated from each sampled tree, even from an apparently healthy Sequoia tree planted in the botanical garden, indicating that Botryosphaeriaceae were present in *S. giganteum* tissues in the latent phase. Other fungal endophytes include 19 isolates of *Alternaria* sp. and 83 isolates of *Diaporthe* sp. The majority of these isolates were obtained from asymptomatic tissues (healthy needles), indicating that these fungi most likely represent endophytes which have no role in the dieback of *S. giganteum* trees in Croatia (Tables 1, 2)

The results of this study will contribute to our knowledge on the distribution of Botryosphaeriaceae, their host associations, ecology and impact on non-native trees. The most important output of this STSM will be a joint scientific publication that will describe the first record of the Botryosphaeriaceae causing dieback of exotic giant Sequoia trees in urban areas of Zagreb.

Table 1. Fungal isolates obtained from diseased *S. giganteum* trees in Croatia

<i>S. giganteum</i> trees	Location	Botryosphaeriaceae-like isolates		Total No. of Botryosphaeriaceae-like isolates	Other isolates		Total no. of isolates
		Mycelium fluffy	Mycelium appressed		<i>Alternaria</i> sp.	<i>Diaporthe</i> sp.	
No. 1	Arboretum 'Malinov park'	+(31)	+(5)	36	-	+(8)	44
No. 2	Arboretum 'Malinov park' St.	+(32)	-	32	-	-	32
No. 3	Ksaver's church park	+(2)	+(3)	5	-	+(9)	14
No. 4	Private garden in Tuškanac	+(2)	-	2	-	+(38)	40
No. 5	Botanical garden	+(8)	-	8	+(19)	+(6)	33
No. 6	Botanical garden	+(8)	-	8	-	+(12)	20
No. 7	CFRI* nursery	+(13)	+(1)	14	-	+(6)	20
No. 8	CFRI nursery	+(17)	-	17	-	+(2)	19
No. 9	CFRI nursery	+(10)	+(1)	11	-	+(2)	13
No.10	Botanical garden	+(12)	-	12	-	-	12
<b>TOTAL</b>		<b>135</b>	<b>10</b>	<b>145</b>	<b>19</b>	<b>83</b>	<b>247</b>

Table 2. Fungal isolates obtained from different *S. giganteum* tree parts

Tree part	Botryosphaeriaceae-like isolates		Total no. of Botryosphaeriaceae-like isolates	Other isolates		Total no. of isolates
	Mycelium fluffy	Mycelium appressed		<i>Alternaria</i> sp.	<i>Diaporthe</i> sp.	
Necrotic needles	+(39)	+(6)	45	-	+(30)	94
Discolored wood	+(90)	+(3)	93	-	+(7)	100
Healthy needles	+(6)	+(1)	7	+(19)	+(46)	53