



## Short Communication

# New records for freshwater lignicolous fungi from Libya

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## Abstract

The present study reports on lignicolous fungi that were identified for the first time from freshwater habitat in Libya. Organisms were isolated from submerged wood and plant remains from different locations in Libya. The collected specimens were examined under light microscope and standard identification keys were used. Of the samples examined, sixteen freshwater lignicolous genera and species have been identified. The identified organisms belong to the classes Ascomycetes (five species) and Hyphomycetes (eleven species) and were not reported previously from Libya.

**Keywords:** Freshwater, lignicolous fungi, submerged wood, Libya.

## Introduction

Aquatic fungi include those occur in freshwater, marine and brackish water. A survey of the literature reveals little information concerning aquatic fungi associated with submerged wood and wood debris. Several mycologists have studied such lignicolous fungi but their efforts have been confined to marine and brackish water<sup>1-4</sup>.

Despite notable fungal taxa isolated from submerged woody substrates in freshwater habitats<sup>5</sup>, freshwater lignicolous fungi are associated with decomposition of woody and herbaceous substrates entering freshwater environs<sup>6</sup>. Their significance lies in their capacity to break down lignocellulose as source of carbon and energy. The value of aquatic fungi in secondary metabolites making has also been recognized<sup>7</sup>.

Recently, Ghenghish<sup>8</sup> reported new taxa for marine fungi from western coast of Libya; however, there is little information on freshwater lignicolous fungi from Libya and North Africa. The aim of this work is to report on lignicolous fungi that were identified for the first time from freshwater habitat in Libya.

## Material and methods

The method of collection and delivery of submerged wood and wood debris to the laboratory was carried out according to Meyers and Reynolds<sup>9</sup>. The submerged wood and wood debris were collected from small ponds, fountains and aquaria from five localities (i.e. Al-Jmill, El-Beidha, Nalot, Shahatt and Tripoli) in west and east of Libya. The collected specimens were transported to laboratory in sterile plastic bags where they were washed with tap water, placed on wet filter papers in glass compartment and incubated at 25°C for 21-28 days. Samples were examined under light microscope periodically for any

fungal reproductive structures. These were then transferred to slides for examination under light microscope and photographed. Lactophenol cotton blue mounts of squashed fungal fruiting bodies were prepared for permanent specimens. The recorded fungi were identified using morphological traits as previously reported<sup>1,3</sup>.

## Results and discussion

In this study sixteen fungal taxa were identified, that were not reported previously from Libya. The identified taxa belong to two classes: Ascomycetes (five taxa) and hyphomycetes (eleven taxa). Some were detected in one location as with *Zalerion varium* which was identified on submerged wood from Tripoli. On other hand, some of the identified taxa were detected in more than one location. Table-1 shows freshwater lignicolous fungi detected in the present study, their source and location of isolation. Many submerged wood specimens, that showed only mycelial growth initially, developed fructification of *Leptosphaeria pelagica* and *L. avicenniae* (ascomycetes) and *Dictyosporium elegans*, *Diplocladilla* sp, *Monodictys pelagica* and *Zalerion varium* (hyphomycetes) (Table-1).

**Discussion:** In the present investigation sixteen fungal taxa were identified that belong to the classes: *Ascomycetes* (5 species) and *Hyphomycetes* (11 species). A characteristic fresh water population of freshwater lignicolous fungi was given by Hughes<sup>10</sup>. Of these fungi, *Alternaria alternata*, *Humicola* sp. and *Dictyosporium elegans* were also found in the present study.

Among the ascomycetes detected in this work, *Chaetomium* sp. was found in drift wood in all five localities included in this study. Fallah and Shearer<sup>11</sup> isolated the fungus from submerged stems of *Carex oligosperma* from fresh water habitats. The

organism has also been isolated from different environments in Iraq<sup>12</sup>. *Didymosphaeria* sp. usually occurs on drift wood in marine habitats<sup>3</sup>. *Didymosphaeria* sp. was isolated from wood and plant debris submerged in small ponds and aquaria in El-Beidha, Shahatt and Tripoli. *Jahnula purpurea* was recorded from submerged wood in fresh water river in Martinique Island, Lesser Antilles<sup>13</sup>. We found the fungus in small ponds and aquaria in Al-Jmill, Nalot, Shahatt and Tripoli but not in El-Beidha. Rani and Panneerselvan<sup>14</sup> reported that *Leptosphaeria* spp. are frequently occurred in wood samples obtained from the intertidal areas of Muthupet mangrove habitat in east coast of India. In the present study the two species *Leptosphaeria pelagica* and *L. avicenniae* were isolated from plant debris mainly in the locations of Al-Jmill, Nalot and Shahatt.

Among the hyphomycetes isolated in the present investigation, *Alternaria alternata* was isolated from submerged wood in small ponds, fountains and aquaria. The specimen examined on submerged wood may represent an aberrant *Dictyosporium elegans*. Insufficient material prevents a thorough study of its morphology. However, *A. alternate* was previously reported from submerged dead stems of *Arundo donax* and *Phragmites australis* in Shat Al-Arab River, Basrah, Iraq<sup>12,15</sup>. Abdel-Aziz<sup>16</sup> identified *Dictyosporium* sp. from submerged samples of *P. australis* collected at random from the River Nile in Egypt. *Dictyosporium elegans* was detected in samples taken from fountains and aquaria in Tripoli only. Raja et al.<sup>17</sup> isolated *D. elegans* from wood and herbaceous debris collected from freshwater habitats in Apalachicola National Forest, Florida Peninsula, USA.

*Diplocladiella* sp. was isolated from plant debris in Shahatt and Tripoli locations. Smits et al.<sup>18</sup> detected *Diplocladiella* sp. in several rivers and mountain streams located in National Parks in Venezuela. In addition, *Diplocladiella* sp. was reported in freshwater foam at Ton Nga Chang Wildlife-Sanctuary, Songkhla, southern Thailand<sup>19</sup>. *Fusarium oxysporium* was isolated from small ponds, fountains and aquaria in all localities. The organism was possibly a contaminant on submerged wood. Ibrahim and Mohamed<sup>20</sup> reported that the fungus was frequently isolated from atmospheric air in El-Beidha city in Libya. *Humicola alopallonella* is a marine species and this is the first record of the fungus in freshwater environment in Libya. In the present study *H. alopallonella* was found in small ponds, fountains and aquaria in all locations studied.

*Monodictys pelagica* is widely distributed over the globe and found over wide-ranging substrates<sup>21</sup>. The fungus have been found in mud and soil of tidal zone of Al Zubair Canal in Iraq<sup>12</sup>. We found *M. pelagica* in small ponds and fountains, but not in aquaria. *Phoma* sp. is frequently encountered in the marine and estuarine environment<sup>10</sup>. The wide variability in pycnidial morphology and spore shape makes species identification of *Phoma* genus difficult; therefore our collection of this fungus was grouped as *Phoma* sp. It should be noted that *Phoma* sp. was identified from submerged wood in the Palmiet River, Durban, South Africa<sup>22</sup>.

**Table-1:** Freshwater lignicoious fungi, their source and location of isolation in Libya.

Fungi	Source	Location
Ascomycetes		
<i>Chaetomium</i> sp.	Small ponds, fountains, aquaria	All studied locations
<i>Didymosphaeria</i> sp.	Small ponds, fountains, aquaria	El-Beidha, Shahatt, Tripoli
<i>Jahnula purpurea</i>	Small ponds, aquaria	Shahatt, Tripoli, Nalot, Al-Jmill
<i>Leptosphaeria pelagica</i>	Small ponds, aquaria	Shahatt, Nalot, Al-Jmill
<i>Leptosphaeria avicenniae</i>	Small ponds, aquaria	Shahatt, Nalot, Al-Jmill
Hyphomycetes		
<i>Alternaria alternate</i>	Small ponds, fountains, aquaria	All studied locations
<i>Dictyosporium elegans</i>	Fountains, aquaria	Tripoli
<i>Diplocladiella</i> sp.	Small ponds, fountains	Shahatt, Tripoli
<i>Fusarium oxysporium</i>	Small ponds, fountains, aquaria	All studied locations
<i>Humicola alopallonella</i>	Small ponds, fountains, aquaria	All studied locations
<i>Monodictys pelagica</i>	Small ponds, fountains	El-Beidha, Shahatt, Tripoli
<i>Phoma</i> sp. (Saccardo, 1880)	Small ponds, fountains, aquaria	All studied locations
<i>Sporidesmium caespitosum</i>	Fountains, aquaria	All studied locations
<i>Stachybotrys</i> sp.	Small ponds, fountains, aquaria	All studied location
<i>Torula</i> sp.	Fountains, aquaria	Nalot, Tripoli
<i>Zalerion varium</i>	Fountains	Tripoli

*Sporidesmium caespitosum* was isolated from fountains and aquaria in all localities studied. Rutherford<sup>23</sup> found this fungus in submerged wood from Mountain Lake, Virginia, USA. *Stachybotrys* sp. is commonly detected in submerged wood in all location included in this investigation. The organism has been reported from marine habitat<sup>9</sup>. The hyphomycete *Torula* sp. was detected on submerged wood in Tripoli and Nalot. *Torula* sp. the so called terrestrial genus was frequently found on submerged wood and plant remains in fresh and brackish water<sup>10</sup>. A previous investigation reported *Torula* sp. from submerged samples of *Phragmites australis* obtained from the River Nile in Egypt<sup>16</sup>. On the other hand, *Zalerion varium* was detected on submerged wood in Tripoli only. Previous studies

reported the isolation *Z. varium* from dead rhizomes of *A. donox* and *P. australis* submerged in Shatt Al Arab River, Iraq<sup>12,15</sup>.

## Conclusion

In conclusion, sixteen fresh water fungal species have been identified from submerged wood. These taxa belong to the classes *Ascomycetes* (5 taxa) and *Hyphomycetes* (11 taxa). The identified organisms were not reported previously from Libya. More studies are needed in the future to address a check-list of fungal taxa from submerged wood (lignicolous) in aquatic (fresh water and marine) habitats.

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