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Running Head: Fungal diversity in the Mediterranean Sea

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Abstract

This review gathers the data derived from many research efforts on marine fungi associated with plant-origin substrates in the Mediterranean Sea. Overall, the review draws up a list of 378 taxa associated with seagrasses, seaweeds and woods.

For each of the three substrates, the taxa belong mainly to the phylum Ascomycota, which on average accounts for 92.7%. Basidiomycota are better represented in seagrasses (9.8%) than in seaweeds (4.9%) and woods (1.2%). Mucoromycota and Mortirellomycota are scarce, while Chytridiomycota are detected only in association with phanerogames (3.7%). Dothideomycetes and Sordariomycetes are the dominant classes, while the orders Pleosporales and Hypocreales are significantly represented in the three sububstrates (42, 37, 10 taxa-30, 40, 16 taxa).

Seagrasses with 210 associated taxa are the organisms with the richest fungal community, immediately followed by seaweeds (180 taxa) and finally by woods (78 taxa). Out of the total, only 12 taxa are shared by the three varieties of substrates, including species that are widespread in marine environments.

However, many algal species and seagrasses inhabiting the Mediterranean Sea remain unexplored. This void indicates the need to apply more extensive surveys in order to explain the huge fungal biodiversity herein hosted and increase the chances of describing novel fungal lineages.

Keywords: *marine fungi, mycobiota, Posidonia oceanica, algae, woods*

1. Introduction

In the last decades, intensive surveys have been performed worldwide with the intent of broadening our understanding on the fungal biodiversity hosted in marine environments (Abdel-Aziz 2010; Abdel-Wahab *et al.* 2014; Alias *et al.* 2010; Calado *et al.* 2021; Ettinger & Eisen 2019; Ettinger *et al.* 2021; Garzoli *et al.* 2018; Gnavi *et al.* 2017; Grasso *et al.* 1985; Hassett *et al.* 2019; Jones & Abdel-Wahab 2005; Jones & Pang 2012a; Loque *et al.* 2010; Poli *et al.* 2020a; Rama *et al.* 2014; Steinke & Jones 1993; Zuccaro & Mitchell 2005). Generally, the occurrence of fungi has been documented on a variety of substrates such as seagrasses, seaweeds, invertebrates, driftwoods, sediments, seafoam etc. (Abdel-Wahab *et al.* 2019; Bovio *et al.* 2019; Bovio *et al.* 2018; Jones & Pang 2012b; Poli *et al.* 2020a; Raghukumar 2017; Rama *et al.* 2014; Zuccaro & Mitchell 2005). While some species are cosmopolitan in their distribution, others are restricted to tropical, cold or temperate waters (Jones & Pang 2012a; Tibell *et al.* 2020); likewise, each substratum seems to recruit a specific mycobiota, although some species are generalists (Poli *et al.* 2020a). A huge amount of information is available on tropical marine fungi from mangrove ecosystems (Abdel-Wahab 2005; Abdel-Wahab *et al.* 2019; Alias *et al.* 1995; Alias *et al.* 2010; Devadatha *et al.* 2021; Hyde & Jones 1988; Manimohan *et al.* 2011; Norphanphoun *et al.* 2018; Poonyth *et al.* 1999; Schmit & Shearer 2003; Steinke & Jones 1993; Suetrong *et al.* 2017). However, knowledge on the distribution and association to substrates in temperate regions is still scant. In this review, we intend to gather all the available information on marine fungi associated with aquatic plants, algae and woods in the Mediterranean Sea.

2. The Mediterranean Area

The Mediterranean Sea is an important hotspot of biodiversity. Literally, the latin words *Mare medi terraneum* means ‘‘sea in the middle of the land.’’ In fact, this large and deep

enclosed sea is connected through the Strait of Gibraltar to the Atlantic Ocean, through the Dardanelles to the Sea of Marmara and the Black Sea, and through the Suez Canal to the Red Sea and the Indian Ocean (Figure 1) (Coll *et al.* 2010). Due to its geomorphological and hydrogeographical features, the Mediterranean basin is home to both temperate and subtropical species (more than 20,000 species of animals, seagrasses and algae) with a high proportion of endemism (Coll *et al.* 2010; Pascual *et al.* 2017).

As in any other environment, biotic and abiotic substrates found in the Mediterranean Sea can be attacked by pathogenic, symbiotic or saprotrophic fungi that constitute a huge part of microbial biodiversity and that, taking part in the nutrient cycling, are vital for supporting the life at all trophic levels. As a consequence of the intense human activity, uncontrolled urbanisation, pollution and climate change, the Mediterranean is facing a deterioration of habitats with a consequent decline in the number of species. Hence, the importance of studying these organism that can contribute to the conservation of the entire ecosystem.

3. The Seagrass Ecosystem

Seagrasses are widely distributed flowering plants that grow and reproduce underwater in shallow coastal environments. Seagrass meadows play central roles in the ecosystems supporting high biodiversity and productivity, stabilizing sediments, contributing to oxygen production and CO_2 consumption, purifying waters and providing nourishment and shelters for marine creatures (Perez-Llorens *et al.* 2014; Raghukumar 2017). Of the 72 species of seagrasses, affiliated to 12 genera, spread worldwide, only 4 are found in the Mediterranean Sea: the endemic *Posidonia oceanica*, *Zostera marina* mostly found as small isolated stands, *Zostera noltii* that forms dense beds in the muddy sand of intertidal areas, and *Cymodocea nodosa* (Borum & Greve 2004; de los Santos *et al.* 2019; Perez-Llorens *et al.* 2014). In particular, *P. oceanica*, is the most important seagrass in this

101 geographic area (Personnic *et al.* 2014) since its meadows are a spawning ground, a nursery
102 and a permanent habitat for over 400 seaweeds species and several thousands of animal
103 species (Boudouresque 2004). As a whole, rhizomes, roots and senescent leafs of this plant
104 form layers named "matte" that are extremely hard to degrade. However, microorganisms
105 such as fungi or bacteria, with their arsenal of enzymes, can transform this recalcitrant
106 organic matter making it available for higher eukaryotes (Vohnik *et al.* 2017). Anthropic
107 impact, exotic species and climate change are seriously threatening this climax community
108 that, for this reason, is a priority in Annex I of the Council Directive92/43/EEC on the
109 conservation of natural habitats and of wild fauna and flora. It must be mentioned that, the
110 alien species *Halophila stipulacea*, introduced through the Suez Channel, is invading the
111 Mediterranean area (Borum & Greve 2004).
112 Of the five species present in the Mediterranean Sea, *C. nodosa* (Cuomo *et al.* 1988), *P.*
113 *oceanica* (Cuomo *et al.* 1988; Cuomo *et al.* 1985; Gnavi *et al.* 2014; Panno *et al.* 2013;
114 Pasqualetti *et al.* 2020; Poli *et al.* 2020a; Vohnik *et al.* 2019; Vohnik *et al.* 2017; Vohník
115 *et al.* 2016), *Z. marina* (Abdel-Wahab *et al.* 2009; Ettinger *et al.* 2021) and *Zostera* sp.
116 (Cuomo *et al.* 1988) have been investigated for fungi (Table 1).
117 So far, *Posidonia oceanica* has been the most extensively studied due to its importance and
118 wide distribution (Cuomo *et al.* 1988; Cuomo *et al.* 1985; Gnavi *et al.* 2014; Panno *et al.*
119 2013; Pasqualetti *et al.* 2020; Poli *et al.* 2020a; Vohnik *et al.* 2019; Vohnik *et al.* 2017;
120 Vohník *et al.* 2016). In general, the majority of the fungi associated with seagrasses were
121 retrieved by applying a culturomic approach; however, culture independent methods were
122 also applied, allowing the detection of organisms in both *P. oceanica* and *Z. marina* that
123 are either uncultivable or rare (Ettinger *et al.* 2021; Vohnik *et al.* 2019). A list of all fungi
124 found in association with different seagrasses is reported in Table 1.
125

3.1 Taxonomic classification of fungi associated with seagrasses

The 86% of the fungi isolated from the Mediterranean seagrasses investigated so far, belong to the phylum Ascomycota, 9.8% to Basidiomycota and only 3.7% and 0.5% to Chytridiomycota and Mucoromycota, respectively (Figure 2).

3.1.1 Ascomycota

Of the six classes of Ascomycota, Dothideomycetes dominate (38% - 69 taxa), followed by Sordariomycetes (35% - 64 taxa), and to a lesser extent by Eurotiomycetes (21% - 38 taxa), Leotiomycetes (3.8% - 7 taxa), and Saccharomycetes (2.2% - 4 taxa) (Figure 3).

As for the orders, Pleosporales, Eurotiales and Hypocreales are recurring with 42, 34 and 30 reported taxa, respectively (Figure 4). Following, with less than half taxa, are Cladosporiales (15) and Hypocreales (11) (Figure 4).

Within Eutotiales, the family Aspergillaceae accounts for more than 94% (Figure 5), 20% of Hypocreales are *incertae sedis*, while Hypocreaceae and Nectriaceae account each for 17%, followed by Stachybotriaceae (13.3%). With the exception of Pleosporaceae (19%) and Dydimosphaeriaceae (14.3%), 17 families of Pleosporales are almost equally represented (Figure 5).

Penicillium is by far dominant in the family Aspergillaceae (70%), followed by *Aspergillus* (23.5%). *Acremonium* (20%) and *Trichoderma* (31.3%) are the most often recorded genera of Hypocreales. On the contrary, no prevalent genera are observed among Pleosporales.

Noteworthy, the presence in *P. oceanica* of the root-symbiont *Posidoniomyces atricolor* (Aigialaceae, Pleosporales) that display a colonization pattern similar to Dark Septate Endophytes (DSE) fungi (Vohnik *et al.* 2019).

3.1.2 Basidiomycota

Six classes of Basidiomycota are associated with Mediterranean seagrasses: Agaricomycetes are among the best-represented (46% - 10 taxa) followed by

Exobasidiomycetes, Microbotryomycetes and Tremellomycetes (14.3% - 3 taxa, each), Ustilagomycetes and Wallemiomycetes (4.8% - 1 taxa, each) (Figure 3).

Overall, of the 8 basidiomyceteous orders reported, Agaricales, Polyporales and Sporidiobolales are the most detected with 4, 5 and 3 taxa, respectively (Figure 4).

3.1.3 Chytridiomycota and Mucoromycota

Chytridiomycota, represented by the two classes Labulomycetes (*Labulomyces* sp.) and Chytridiomycetes (*Chytridium* sp.) were detected only by culture-independent methods (Ettinger *et al.* 2021; Vohnik *et al.* 2019). Finally, only *Cunninghamella bertolletiae* accounts for Mucoromycota.

3.2 Hosts and hypothetical ecological roles

Overall, 210 taxa were recorded on Mediterranean seagrasses (Table 1). However, 196 are associated with *P. oceanica*, of which 187 are exclusive. This is most probably due to the highest number of investigations on *P. oceanica* rather than on species of *Zostera* and on *C. nodosa*. Consequently, a comparison among the fungal communities retrieved from the different seagrasses is not possible.

Concerning the parts of *P. oceanica*, rhizomes seem to host the greatest number of fungal species (76), followed by matte (68), leaves (56) and roots (53) (Table1). A recent investigation, reported a significant difference among the mycobiota of the four parts of *P. oceanica*, with the only exception of leaves *vs* matte, which was explained by their similar structure and composition (Poli *et al.* 2020a). In fact, matte are mainly composed by decaying and fluctuating leaves (Vohnik *et al.* 2017). Noteworthy is the detection of strictly marine species affiliated to Lulworthiaceae on rhizomes and roots. Members of this family are well-known cellulases producers and can degrade wood and marsh plants in marine and estuarine environments, thus contributing to the cycling of nutrients (Raghukumar 2017).

Similarly to terrestrial phanerogams, differently organized parts of a complex aquatic plant support unique mycobiota. For instance, yeasts are common dwellers of land plants phylloplane (Inacio *et al.* 2010); likewise, several ascomicetous and basidiomicetous yeasts (*Saccharomyces* sp.; *Sporobolomyces roseus, Cryptococcus* sp., *Dioszegia* sp., *Malassezia* sp.) were observed on the leaves of both *P. oceanica* and *Z. marina*. Analogously, Vohnik et al. (2019) showed that *P. oceanica* roots host the endophyte *Posidoniomyces atricolor*. Nevertheless, due to the lack of data and to a minimal sampling size, this idea cannot be assumed as general rule valid for any Mediterranean seagrass.

Despite some individual species play a clear role (i.e. plat pathogens; Table 1), the relation between the majority of them and the seagrass is still obscure and hard to disclose. Even so, the selective recruitment of distinct mycobiota could increase the resistance to pathogens and predators through the production of bioactive secondary metabolites. For example, crude extracts of *P. oceanica* displayed antimicrobial and antimycotic properties (Bernard & Pesando 1989; Orhan *et al.* 2006), even though the true responsible (single fungal species, mycobiota *in toto*, host plant) for the production of the active compounds is still unclear.

4. The Macroalgal Ecosystem

Macroalgae, found in both intertidal and subtidal zones, abundantly inhabit the Oceans, where they cover seabed or solid substrata (rocks, reefs, shells, etc.). Classified into three major lineages, green algae (Chlorophyta), red algae (Rhodophyta) and brown algae (Phaeophyceae, kingdom Straminipila) (Raghukumar 2017), these photosynthetic organisms, are primary energy producers and support the ecosystems. Of the 9,200-12,500 seaweeds described, 1,114 (277 brown, 657 red and 190 green algae) have been estimated to dwell in the Mediterranean Sea (Bartolo *et al.* 2020; Coll *et al.* 2010). Notwithstanding, only few Mediterranean algae have been investigated to study the mycobiota they are

associated with and/or their reciprocal relations (Bovio *et al.* 2018; Cuomo *et al.* 1988; Garzoli *et al.* 2014; Garzoli *et al.* 2018; Gnavi *et al.* 2017; Pasqualetti *et al.* 2020; Poli *et al.* 2020a, b; Poli *et al.* 2018). In detail, only 33 algal species were studied in the last decades: 18 brown, 9 green and 6 red algae (Table 2).

A huge algal biodiversity finds home in the *P. oceanica* meadows: suffice it to know that only the epiphytes count more than 300 species of seaweeds (Piazzi *et al.* 2016). Generally, algae are known to produce bioactive compounds (Pinteus *et al.* 2015; Pinteus *et al.* 2018; Rodrigues *et al.* 2015), although a number of studies indicates that algicolous fungi are the true responsible for the synthesis of these molecules (Flewelling *et al.* 2015; Overy *et al.* 2014).

A list of all fungi found in association with brown, green and red Mediterranean algae is reported in Table 2.

4.1 Taxonomic classification of fungi associated with seaweeds

The majority of the fungi isolated from the seaweeds sampled in the Mediterranean sea belong to the phylum Ascomycota (94.5%), while Basidiomycota account for 4.9%. The presence of Mortierellomycota is negligible (Figure 6). No representative of Chytridiomycota has been reported until now. The reason for this is probably dependent on the methods adopted for the detection of fungi: it is well known that Chytridiomycota are found only by applying culture-independent approaches.

4.1.1 Ascomycota

Four classes of Ascomycota are associated with seaweeds. Similarly to what observed in seagrasses, Sordariomycetes and Dothideomycetes prevail (37.7% - 68 taxa; 36.3% - 61 taxa), followed by Eurotiomycetes (19% - 32 taxa) and for a minimal part by Leotiomycetes (4.2% - 7 taxa) (Figure 3).

The most abundant orders are Hypocreales, Pleosporales and Eurotiales with 40, 37 and 30 reported taxa, respectively (Figure 4). Cladosporiales follows with 18 taxa (Figure 7).

The family Aspergillaceae accounts for more than 93% within the Eurotiales (Figure 8); most of Hypocreales are *incertae sedis* (27.5%), Hypocreaceae represent the 15% of the order, while Bionetriaceae and Nectriaceae are equally present (12.5% each). Among the 14 families of Pleosporales observed, Pleosporaceae greatly contribute with 32.4% followed by Roussoellaceae and Thyridariaceae (10.8% each) (Figure 8).

Penicillium and *Aspergillus* are dominant in the family Aspergillaceae (50% and 40%). *Sarocladium* and *Trichoderma* (12.5% each) are more abundant than the other 21 genera of Hypocreales. As for Pleosporales, the genus *Alternaria* is the most detected (21.6%).

4.1.2 Basidiomycota and Mortierellomycota

Four classes of Basidiomycota are associated with the collected seaweeds. While Agaricomycetes are present with six taxa, Cystobasidiomycetes, Microbotryomycetes and Wallemiomycetes contribute with only one taxon each (Figure 3).

Among the six orders of Basidiomycota reported, Russulales and Agaricales are present with three and two taxa, respectively while only one taxon each is reported for Buckleyzymales, Polyporales, Sporidiobolales and Wallemiales (Figure 7).

Mortierella alpina is the only species of Mortierellomycota found in association with seaweeds.

4.2 Hosts and hypothetical ecological roles

Overall, 180 taxa were recorded on Mediterranean seaweeds, of which 92, 39 and 3 were exclusively isolated from brown, green and red algae respectively (Table 2). At a first look, it may appear that brown algae host a broader fungal diversity. However, the difference in sampling sizes does not allow a reliable comparison between Chlorophyta, Rhodophyta and Phaeophyceae, even though it must be bear in mind that a number of studies indicates

brown algae as the richest in fungal species (Garzoli *et al.* 2018; Zuccaro & Mitchell 2005). Following a comparison between the fungal communities associated with a brown and a green alga (*Padina pavonica vs Flabellia petiolata*) harvested in the same phytocoenosis of *P. oceanica,* in the same sites and at the same time, it was clear how the biodiversity of *P. pavonica* was significantly higher than *F. petiolata* (Poli *et al.* 2020a), confirming the previous investigations.

5. Drift- and submergerd wood

Wood is the foremost substrate of marine fungi. Allochthonous wood from terrestrial plants find different ways to enter the sea. For instance, parts of dead plants can drift into coastal waters (driftwood) and either be deposited on beaches or float freely; alternatively, they may turn submerged in the sea. In addition, jetties, pilings, lignocellulosic cordage or boats, represent a way through which wood is introduced in the sea by humans.

5.1 Taxonomic classification of wood – colonizing fungi

As ascertained for seagrasses and seaweeds, Ascomycota, with 97.6%, depict the greatest part of the fungi isolated from wood specimens. On the contrary, the presence of both Basidiomycota and Mucoromycota is marginal, accounting for only 1.2% each (Figure 9). The absence of Chytridiomycota must be underlined, bearing in mind that, no culture-independent studies have been applied to woods.

5.1.1 Ascomycota

Also in drift- and submerged woods, Sordariomycetes are the best represented class (68.7% - 56 taxa). Dothideomycetes contribute with 15 taxa (18.7%), while Eurotiomycetes and Leotiomycetes are a minority (9.6% - 8 taxa, 3.6% - 3 taxa) (Figure 3).

Microascales, Hypocreales, and Pleosporales are the most abundant orders with 21, 16 and 10 taxa respectively, followed by Lulworthiales with 9 taxa (Figure 10).

More than 90% of Microascales are Haloshaeriaceae (Figure 11), while most of Hypocreales are Nectriaceae (37.5%). Finally, Pleosporaceae are the 40% of the reported Pleosporales (Figure 11).

Halosphaeria and *Remispora* are the most abundant genera in the family Halosphaeriaceae (14.3% each) followed by *Ceriosporopsis*, *Corollospora* and *Nereiospora* (9.5% each). *Acremonium*, *Fusarium* and *Trichoderma* (18.75%, 18.75% and 12.5%) are the genera of Hypocreales more often retrieved, while *Alternaria* is the most detected genus of Pleosporales (20%).

5.1.2 Basidiomycota and Mucoromycota

Only one class of Basidiomycota is associated with the wood specimens. Agaricomycetes are present with *Nia vibrissa* (Agaricales, Niacea).

A similar situation applies to Mucoromycota: *Rhizopus stolonifer* (Mucorales, Mucoraceae) is the only species of Mucoromycetes observed in driftwood (Figure 3, 10; Table 3).

5.2 Hosts and hypothetical ecological roles

In total, 84 taxa were detected on driftwood, submerged wood or test panels in the Mediterranean Sea (Table 3). Marine fungi, with the aid of their enzymes, are the main decomposers of woody substrates that enter the oceans and that, for ca. 80%., consists of the recalcitrant lignocellulose (Hyde *et al.* 1998; Raghukumar 2017).

The retrieval of only one member of Basidiomycota (*Nia vibrissae*) may contradict the well-known ability of these fungi to degrade lignocellulose material in terrestrial environments. However, notwithstanding the high incidence of fungi observed on woody substrates in marine environments worldwide, there is limited evidence that assess their degradation ability (Hyde *et al.* 1998; Pointing & Hyde 2000). Nevertheless, Ascomycota seem to be here the key players involved in this activity. In fact, along with *Nia vibrissa*,

298 species like *Ceriosporopsis halima*, *Cirrenalia macrocephala*, *Corollospora maritima*,
299 *Culcitalna achraspora*, *Humicola alopallonella*, *Lulworthia* spp, *Nautosphaeria*
300 *cristaminuta*, *Paradendryphiella salina* and *Zalerion maritimum* (*Lulwoana uniseptata*)
301 and many others, are endowed with cellulases, hemicellulases and/or ligninolitic enzymes
302 (Goncalves *et al.* 2021; Luo *et al.* 2005; Pointing & Hyde 2000; Raghukumar 2017). In
303 line with these evidences, the cited species were retrieved from drift- and submerged woods
304 and/or test panels in the Mediterranean Sea (Table 3).
305 The "wood situation" remarkably differs from what explained for algae and seagrasses. It
306 is not correct to indicate a specific wood-mycobiota, for the following reasons. First, we
307 must consider the origin of the driftwoods that, after leaving their terrestrial location, can
308 float for long distances ad for indefinite periods. The longer the stay in the Sea, the higher
309 the probability of colonization by strictly marine fungi. Not less important, woods are
310 lifeless substrata, therefore missing an active role in shaping a specific fungal community.
311 Therefore, the definition of mycobiota associated with drift- and submerged woods should
312 better be limited to strictly marine fungi.

313 **5. Conclusion**

314 Overall, 378 taxa were reported in association to seagrasses, algae and woods in the
315 Mediterranean Sea (Tables 1-3). In terms of number of taxa, seagrasses show the richest
316 mycobiota (210), immediately followed by seaweeds (180). A similar conclusion cannot
317 be drawn for woods, where the taxa associated were less than halved (78). As indicated in
318 Figure 12, only 12 taxa are shared by the three varieties of substrates, namely
319 *Cladosporium halotolerans*, *Clonostachys rosea*, *Corollospora maritima*, *Gibellulopsis*
320 *nigrescens*, *Paralulworthia halima*, *Penicillium expansum*, *Purpureocillium lilacinum*,
321 beside unidentified species of *Acremonium*, *Phoma*, *Pleospora* and *Trichoderma*. The

322 above-cited species are broadly diffused in marine habitats; consequently, this overlapping
323 does not come as a surprise as well as the already mentioned substrate specificity.
324 The list of fungal species reported in the Mediterranean Sea remarkably increased in the
325 last last 15 years, when it was decided to investigate more thouroughly the underwater
326 fungal diversity. To this aim more intensive, regular and accurate sampling campaigns were
327 adopted, leading to the analysis of a wider number of specimens (algal thalli, plant parts
328 etc.). In addition, the upcoming of molecular approaches together with the more efficient
329 isolation techniques allowed the identification of taxa like sterile mycelia, cryptic species
330 or new lineages that were not previously detected. To this respect, it is interesting to
331 underline the high number of novel marine taxa described in the last few years in the
332 Mediterranean waters (Poli *et al.* 2021a, b; Poli *et al.* 2020a, b; Poli *et al.* 2019; Vohnik *et*
333 *al.* 2019). This checklist is intended to grow even more, if we consider that about 1,100
334 algal species inhabit the Mediterranean Sea and that only 34 have been surveyed for the
335 presence of fungi. The data gathered in this review indicate that amost 15% of the taxa
336 isolated are identified only at genus level. Considering that a few isolates remained
337 identified at higher ranks (not reported in the tables), this percentage increases to about
338 20%. Hawksworth (1991) hypothesised that 5.9 fungi are associated with a plant in a given
339 location. By applying this equation, we can estimate to 1,350 the number of fungal species
340 still unreported in the Mediterranean Sea. However, bearing in mind that the average
341 number of taxa isolated from Mediterranean plant and algae is approximately 70 for each
342 substratum, this estimate raises to 15,600.
343 In conclusion, the Mediterranean Sea is a well recognised hotspot of biodiversity. Not only
344 it is home to flora and fauna but also to a treasure of precious microorganisms that, beside
345 their ecological importance can be harnessed for biotechnological purpose
346 **Acknowledgements**

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577
578 **CAPTION TO ILLUSTRATIONS**
579 **Figure 1.** Map of the Mediterranean area. Asterisks indicates sampled locations.
580 **Figure 2.** Distribution of fungi associated with Mediterranean seagrasses among phyla.
581 **Figure 3.** Distribution of fungi associated with seagrasses (green), seaweeds (red) and
582 woods (ochre) in different classes. The number of species for each class is indicated for
583 algae, seagrasses and woods.
584 **Figure 4.** Distribution of fungi associated with Mediterranean seagrasses in orders.
585 Number of species is indicated next to each bar.
586 **Figure 5.** Distribution of fungi associated with Mediterranean seagrasses affiliated with
587 the three major orders in families.
588 **Figure 6.** Distribution of fungi associated with Mediterranean seaweeds among phyla.

589 **Figure 7.** Distribution of fungi associated with Mediterranean seaweeds in orders.
590 Number of species is indicated next to each bar**.**
591 **Figure 8.** Distribution of fungi associated with Mediterranean seaweeds affiliated with
592 the three major orders in families.
593 **Figure 9.** Distribution of fungi associated with driftwoods, submerged woods and test
594 blocks seagrasses among phyla in the Mediterranean Sea.
595 **Figure 10.** Distribution of fungi associated with woods in orders. Number of species is
596 indicated next to each bar**.**
597 **Figure 11.** Distribution of fungi associated with Mediterranean seaweeds affiliated with
598 the three major orders in families.
599 **Figure 12.** Venn diagram showing the total number of taxa and shared taxa among
600 seagrasses, algae and woods in the Mediterranean Sea.
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612 **Table 1.** Checklist of fungal taxa associated with Mediterranean seagrasses. CN = *Cymodocea nodosa*; PO = *Posidonia oceanica*; Z= *Zostera*
613 sp.; ZM = *Zostera marina*.
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Taxon	Host	Host part	Trophic mode/Guild	Culture dependent	Culture independent	Reference
ASCOMYCOTA						
Cremasteria cymatilis Meyers & R.T. Moore	PO	Leaves	nd	X		Panno et al. 2013
Myxotrichum deflexum Berk.	PO	Leaves	nd	X		Garzoli 2013
Radulidium epichloës (Ellis & Dearn.) Arzanlou, W. Gams & Crous	PO	Matte	nd	X		Panno et al. 2013
Stachylidium bicolor Link	PO	Rhizomes/Matte		X		Panno et al. 2013
DOTHIDEOMYCETES						
Cyclothyrium sp.	PO	Matte	nd	X		Panno et al. 2013
Botryosphaeriales						
Botryosphaeriaceae						
Botryosphaeria dothidea (Moug.) Ces. & De Not	PO	ND	Pathotroph/Plant pathogen	X		Pasqualetti et al. 2020
Capnodiales						
Capnodiaceae						
Capnodium sp.	PO	Rhizomes	Saprotroph/Undefined saprotroph	X		Panno et al. 2013 Poli et al. 2020a

Phaeothecaceae						
Neophaeotheca salicorniae (Crous & Roets) Abdollahz. & Crous	ZM	Roots	nd		X	Ettinger et al. 2021
Teratosphaeriaceae						
Acrodontium pigmentosum Videira & Crous	PO	Matte	nd	X		Poli et al. 2020a
Hortaea werneckii (Horta) Nishim. & Miyaji	ZM	Roots	Pathotroph		X	Ettinger et al. 2021
Cladosporiales						
Cladosporiaceae						
Cladosporium sp.	PO ZM	Rhizomes/Roots Leaves/Roots	nd	X	X	Panno et al. 2013; Vohnik et al. 2019; Ettinger et al. 2021
Cladosporium aggregatocicatricatum Bensch, Crous & U. Braun	PO	Rhizomes	nd	X		Poli et al. 2020a
Cladosporium allicinum (Fr. : Fr.) Bensch, U. Braun & Crous	PO	Leaves/Matte	nd	X		Poli et al. 2020a
Cladosporium cladosporioides (Fresen.) G.A. de Vries	PO	Roots/Rhizomes/Leaves/Matte	Pathotroph-Symbiotroph /Endophyte-Epiphyte-Plant Pathogen	X		Panno et al. 2013; Garzoli 2013; Poli et al. 2020a
Cladosporium cucumerinum Ellis & Arthur	PO	Leaves	Pathotroph/Plant pathogen	X		Panno et al. 2013
Cladosporium halotolerans Zalar, de Hoog & Gunde-Cim.	PO ZM	Rhizomes Roots	Pathotroph/Animal pathogen	X	X	Poli et al. 2020a; Ettinger et al. 2021

Cladosporium herbarum (Pers.) Link	PO ZM	Rhizomes/Matte/Leaves Leaves/Roots	Pathotroph-Saprotroph/ Plant Pathogen-Wood Saprotroph	X	X	Panno et al. 2013; Garzoli 2013; Poli et al. 2020a; Ettinger et al. 2021
Cladosporium oxysporum Berk. & M.A. Curtis	PO	Roots	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Panno et al. 2013
Cladosporium pseudocladosporioides Bensch, Crous & U. Braun	PO	Leaves/Matte/Roots	nd	X		Garzoli 2013; Poli et al. 2020a
Cladosporium ramotenellum K. Schub., Zalar, Crous & U. Braun	PO	Roots	nd	X		Garzoli 2013
Cladosporium sphaerospermum Penz.	PO	Leaves/Rhizomes/Roots	Symbiotroph/Endophyte	X		Panno et al. 2013; Poli et al. 2020a
Cladosporium tenellum K. Schub., Zalar, Crous & U. Braun	PO	nd	nd	X		Pasqualetti et al. 2020
Cladosporium tenuissimum Cooke	PO	Rhizomes	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Panno et al. 2013
Cladosporium velox Zalar, de Hoog & Gunde-Cim.*	PO	Rhizomes	nd	X		Poli et al. 2020a
Cladosporium xylophilum Bensch, Shabunin, Crous & U. Braun	PO	Roots/Matte	nd	X		Poli et al. 2020a
Dothidelaes						
Dothideales i.s.						
Biatriospora sp.	PO	Matte	nd	X		Panno et al. 2013 Gnavi et al. 2014
Leptospora rubella (Pers.) Rabenh.	PO	Leaves	Pathotroph- Symbiotroph/Endophyte -Plant Pathogen	X		Garzoli PhD

Dothioraceae						
Aureobasidium pullulans (De Bary) G. Arnaud ex Cif., Ribaldi & Corte	PO ZM	Rhizomes Leaves	Pathotroph-Symbiotroph/ Animal Pathogen-Endophyte-Epiphyte-Plant Pathogen	X	X	Poli et al. 2020a Ettinger et al. 2021
Nothophaeocryptopus gaeumannii (T. Rohde) Videira, C. Nakash., U. Braun & Crous	PO	Leaves	nd	X		Panno et al. 2013
Mycosphaerellales						
Mycosphaerellaceae						
Pseudocercosporella fraxini (Ellis & Kellerm.) U. Braun	PO	Leaves	nd	X		Panno et al. 2013
Ramularia endophylla Verkley & U. Braun	PO	Leaves	Pathotroph/Plant pathogen	X		Panno et al. 2013
Pleosporales						
Phoma sp.	PO, CN	Matte	nd	X		Cuomo et al. 1985; Cuomo et al. 1988; Panno et al. 2013
Aigialaceae						
Posidoniomyces atricolor Vohník & Réblová	PO	Roots	Endophyte	X	X	Vohnik et al. 2016; Vohnik et al. 2019
Dictyosporiaceae						
Paradendryphiella salina (G.K. Sutherland) Woudenb. & Crous	Z, CN	nd	nd	X		Cuomo et al. 1988

Leptosphaeriaceae						
Leptosphaeria coniothyrium (Fuckel) Sacc.	PO	Rhizomes/Matte	nd	X		Panno et al. 2013
Cucurbitariaceae						
Neopyrenochaeta acicola (Moug. & Lév.) Sacc	PO	Matte	nd	X		Panno et al. 2013; Gnavi et al. 2014
Neocucurbitaria cava (Schulzer) Valenz.-Lopez, Crous, Stchigel, Guarro & J.F. Cano	PO	Matte	Saprotoph/ Litter Saprotroph-Soil Saprotroph	X		Panno et al. 2013
Neocucrbitaria keratinophila (Verkley, C. Ferrer & Gené) Valenz.-Lopez, St	PO	Matte	nd	X		Panno et al. 2013; Gnavi et al. 2014
Pyrenochaeta sp.	PO	Matte	nd	X		Panno et al. 2013 Gnavi et al. 2014
Didymellaceae						
Didymella fabae G.J. Jellis & Punith.	PO	Roots	nd	X		Poli et al. 2020a
Epicoccum sp.	Z, CN	nd	nd	X		Cuomo et al. 1988
Epicoccum nigrum Link	PO	Roots	Pathotroph-Symbiotroph/Endophyte-Lichen Parasite-Plant Pathogen		X	Vohnik et al. 2019
Didymosphaeriaceae						
Paracamarosporium psoraleae Crous & M.J. Wingf.	PO	Leaves	nd	X		Poli et al. 2020a

Paraconiothyrium fuckelii (Sacc.) Verkley & Gruyte	PO	Rhizomes/Matte	nd	X		Panno et al. 2013
Paraconiothyrium sporulosum (W. Gams & Domsch) Ver	PO	Rhizomes	nd	X		Panno et al. 2013
Paraconiothyrium variabile Riccioni, Damm, Verkley & Crous	PO	Matte	nd	X		Poli et al. 2020a
Paraphaeosphaeria michotii (Westend.) O.E. Erikss.	PO	Rhizomes	nd	X		Poli et al. 2020a
Pseudopithomyces chartarum (Berk. & M.A. Curtis) Jun F. Li, Ariyaw. & K.D. Hyde	PO	Roots	nd		X	Vohnik et al. 2019
Halotthiaceae						
Halotthia posidoniae (Durieu & Mont.) Kohlm.	PO	Rhizomes	nd	X		Cuomo et al. 1985
Lentitheciaceae						
Pleurophoma sp.	PO	Rhizomes	nd	X		Panno et al. 2013 Poli et al. 2020a
Lophiotremataceae						
Lophiotrema rubi (Fuckel) Y. Zhang ter, C.L. Schoch & K.D. Hyde	PO	Rhizomes/Matte	nd	X		Panno et al. 2013; Poli et al. 2020a
Massarinaceae						
Massarina sp.	PO	Rhizomes	Pathotroph-Saprotroph/ Plant Pathogen-Undefined Saprotroph	X		Panno et al. 2013
Microsphaeropsidaceae						

Microsphaeropsis arundinis (S. Ahmad) B. Sutton	PO	Matte	nd	X		Panno et al. 2013; Poli et al. 2020a
Phaeosphaeriaceae						
Phaeosphaeria sp.	PO	Matte	Saprotroph/undefined saprotroph	X		Panno et al. 2013 Pasqualetti et al. 2020
Pleosporaceae						
Alternaria sp.	PO	Leaves/Matte/Rhizomes	Pathotroph-Saprotroph-Symbiotroph/ Animal Pathogen-Endophyte-Plant Pathogen-Wood Saprotroph			Poli et al. 2020a
Alternaria alternata (Fr.) Keissl.	PO ZM	Roots/Matte Roots Leaves/Roots	nd	X	X	Panno et al. 2013 Vohnik et al. 2019 Ettinger et al. 2021
Alternaria maritima-like	Z, CN	nd	nd	X		Cuomo et al. 1988
Pleospora sp.	PO	nd	nd	X		Pasqualetti et al. 2020
Pleospora typhicola (Cooke) Sacc.	PO	Matte	nd	X		Panno et al. 2013 Gnavi et al. 2014
Stemphylium solani G.F. Weber	PO	Leaves/Rhizomes	Pathotroph/Plant pathogen	X		Garzoli 2013
Stemphylium vesicarium (Wallr.) E.G. Simmons	PO	nd	Pathotroph/Plant pathogen	X		Pasqualetti et al. 2020
Tamaricicola sp.	PO	nd	nd	X		Pasqualetti et al. 2020
Pyrenochaetopsidaceae						

Pyrenochaetopsis sp.	PO	Matte	Pathotroph-Saprotroph-Symbiotroph/Endophyte-Lichen Parasite-Undefined Saprotroph	X		Panno et al. 2013; Gnavi et al. 2014
Pyrenochaetopsis leptospora (Sacc. & Briard) Gruyter, Aveskamp & Verkley	PO	Rhizomes	nd	X		Poli et al. 2020a
Roussoellaceae						
Neoroussoella solani (Crous & M.J. Wingf.) Jayasiri & K.D. Hyde	PO	Leaves	nd	X		Poli et al. 2020a
Neoroussoella lignicola Poli, Bovio, Prigione & Varese	PO	Leaves	nd	X		Poli et al. 2020b
Sporomiaceae						
Preussia funiculata (Preuss) Fuckel	PO	Rhizomes	nd	X		Poli et al. 2020a
Preussia terricola Cain	PO	Roots	nd	X		Poli et al. 2020a
Westerdykella dispersa (Clum) Cejp & Milko	PO	Leaves	nd	X		Panno et al. 2013
Thyridariaceae						
Parathyridariella dematiacea Prigione, Poli, Bovio & Varese	PO	Rhizomes	nd	X		Poli et al. 2020b
Parathyridaria ramulicola Mapook, Camporesi and Hyde	PO	Rhizomes	nd	X		Poli et al. 2020b
Torulaceae						

Torula herbarum (Pers.) Link	PO	Roots	Pathotroph-Symbiotroph/Endophyte-Plant pathogen	X		Panno et al. 2013
Zopfiaceae						
Sphaeria biturbinata Durieu & Mont.	PO	Rhizomes	nd	X		Cuomo et al. 1985
EUROTIOMYCETES						
Eurotiales						
Aspergillaceae						
Aspergillus awamori Nakaz. 1915	PO	Rhizomes	nd	X		Poli et al. 2020a
Aspergillus conicus Blochwitz	PO	Roots	nd	X		Poli et al. 2020a
Aspergillus flavus Link	PO	nd	nd	X		Pasqualetti et al. 2020
Aspergillus insuetus (Bainier) Thom & Church	PO	nd	Pathotroph/Animal pathogen	X		Pasqualetti et al. 2020
Aspergillus pseudoglaucus Blochwitz	PO	Rhizomes	Pathotroph/Animal pathogen	X		Poli et al. 2020a
Aspergillus sydowii (Bainier & Sartory) Thom & Church*	PO	Rhizomes	Pathotroph/Animal pathogen	X		Poli et al. 2020a
Aspergillus fumigatus Fresen.	PO	Rhizomes/Roots	Pathotroph-Saprotroph/Animal pathogen	X		Panno et al. 2013; Poli et al. 2020a
Aspergillus versicolor (Vuill.) Tirab.	PO	Rhizomes	Pathotroph/Animal pathogen	X		Panno et al. 2013; Poli et al. 2020a

Penicillium antarcticum A.D. Hocking & C.F. McRae	PO	Rhizomes/Roots	nd	X		Poli et al. 2020a
Penicillium aurantiogriseum var. *viridicatum* (Westling) Fris.	PO	Leaves	Pathotroph/Plant pathogen	X		Panno et al. 2013
Penicillium brevicompactum Dierckx	PO	Roots/Matte	Symbiotroph/erndophyte	X		Panno et al. 2013; Poli et al. 2020a
Penicillium canescens Sopp.	PO	Matte	Symbiotroph/erndophyte	X		Poli et al. 2020a
Penicillium chrysogenum Thom	PO	Leaves/Rhizomes/Roots/Matte	Pathotroph/Plant pathogen	X		Panno et al. 2013; Garzoli 2013; Poli et al. 2020a
Penicillium commune Thom	PO	Leaves/Rhizomes/Roots/Matte	Pathotroph/Animal pathogen	X		Poli et al. 2020a
Penicillium cremeogriseum Chalab.	PO	Rhizomes	nd	X		Poli et al. 2020a
Penicillium crustosum Thom	PO	Roots	nd	X		Poli et al. 2020a
Penicillium cvjetkovicii S. W. Peterson, Z. Jurjevic & J. C. Frisvad	PO	Roots	nd	X		Poli et al. 2020a
Penicillium decumbens Thom.	PO	Leaves/Matte	Pathotroph/Animal pathogen	X		Panno et al. 2013
Penicillium expansum Link	PO	Rhizomes/Matte	Pathotroph/Plant pathogen	X		Panno et al. 2013
Penicillium glabrum (Wehmer) Westling	PO	Rhizomes	Pathotroph/Plant pathogen	X		Poli et al. 2020a
Penicillium italicum Wehmer	PO	Rhizomes	nd	X		Panno et al. 2013
Penicillium janczewskii K.M. Zalessky	PO	Leaves/Rhizomes/Roots/Matte	nd	X		Panno et al 2013; Poli et al. 2020a
Penicillium paneum Frisvad	PO	Matte	nd	X		Poli et al. 2020a

Penicillium pinophilum Hedgc.	PO	Leaves	nd	X		Poli et al. 2020a
Penicillium restrictum J.C. Gilman & E.V. Abbott	PO	Rhizomes	nd	X		Panno et al. 2013
Penicillium roseopurpureum Dierckx	PO	Rhizomes	nd	X		Poli et al. 2020a
Penicillium sanguifluum (Sopp) Biourge	PO	nd	nd	X		Pasqualetti et al. 2020
Penicillium solitum Westling	PO	Leaves	nd	X		Poli et al. 2020a
Penicillium spinulosum Thom	PO	Rhizoimes/Matte	Pathotroph/Animal pathogen	X		Panno et al. 2013
Penicillium steckii K.M. Zalessky	PO	Matte/ Rhizomes	nd	X		Poli et al. 2020a
Penicillium vinaceum J.C. Gilman & E.V. Abbott	PO	Leaves	nd	X		Poli et al. 2020a
Penicillium waksmanii K.M. Zalessky	PO	Leaves/Matte	nd	X		Panno et al. 2013
Trichomaceae						
Talaromyces assiutensis Samson & Abdel-Fattah	PO	Roots	nd	X		Poli et al. 2020a
Talaromyces trachyspermus (Shear) Stolk & Samson	PO	Rhizomes	nd	X		Poli et al. 2020a
Chaetothyriales						
Herpotrichiellaceae						
Exophiala oligosperma Calandron ex de Hoog & Tintel.	PO	Matte	nd	X		Panno et al. 2013
Phialophora cinerescens (Wollenw.) J.F.H. Beyma	PO	Leaves	Pathotroph/Plant pathogen	X		Panno et al. 2013

Onygenales						
Onygenaceae						
Chrysosporium lobatum Scharapov	PO	Roots	nd	X		Poli et al. 2020a
Chrysosporium undulatum P. Vidal, Guarro & Ulfig	PO	Rhizomes/Roots	nd	X		Poli et al. 2020a
LECANOROMYCETES						
Lecanoraceae						
Lecanora populicola (DC.) Duby	ZM	Leaves	nd		X	Ettinger et al. 2021
LEOTIOMYCETES						
Meliniomyces sp.	ZM	Leaves	Saprotroph-Symbiotroph/ Ectomycorrhizal-Endophyte-Ericoid Mycorrhizal-Litter Saprotroph-Orchid Mycorrhizal		X	Ettinger et al. 2021
Helotiales						
Helotiaceae						
Crocicreas cyathoideum var. *cacaliae* (Bull)S.E. Carp.	PO	Rhizomes	nd	X		Panno et al. 2013
Helotiales i.s.						

Dactylaria humicola G.C. Bhatt & W.B. Kendr.	PO	Roots	Pathotroph/Plant pathogen	X		Panno et al. 2013
Pseudocercosporidium carotae (Årsvoll) de Hoog & Oorschot	PO	Leaves/Matte	nd	X		Gnavi et al 2014
Hyaloscyphaceae						
Dasyscyphus virgineus (Batsch) Gray	PO	Leaves	nd	X		Poli et al. 2020
Ploettnerulaceae						
Cadophora sp.	PO	Matte	Symbiotroph/Endophyte	X		Panno et al. 2013
Cadophora bubakii (Laxa) Damm & S. Bien	PO	Rhizomes/Matte	nd	X		Panno et al. 2013
SACCHAROMYCETES						
Saccharomycetales						
Saccharomicetaceae						
Saccharomyces paradoxus Bachinskaya	ZM	Leaves/Roots	nd		X	Ettinger et al. 2021
Saccharomyces sp.	ZM	Leaves/Roots	nd		X	Ettinger et al. 2021
Saccharomycetales i.s.						
Candida zeylanoides (Castell.) Langeron & Guerra	PO	Matte	Pathotroph/Animal pathogen	X		Panno et al. 2013
Dypodascaceae						
Galactomyces candidus de Hoog & M.T. Sm	PO	Matte	Pathotroph-Saprotroph/ nd	X		Panno et al. 2013

SORDARIOMYCETES						
Diaporthales						
Diaporthaceae						
Diaporthe sp.	PO	Rhizomes	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Panno et al. 2013
Gnomoniaceae						
Ophiognomonia setacea (Pers.) Sogonov	PO	Leaves/Matte	nd	X		Poli et al. 2020a
Glomerellales						
Plectosphaerellaceae						
Gibellulopsis nigrescens (Pethybr.) Zare, W. Gams & Summerb.	PO	Matte/Rhizomes	nd	X		Panno et al. 2013; Poli et al. 2020a
Hypocreales						
Sarocladiaceae						
Sarocladium bacillisporum (Onions & G.L. Barron) Summerb.	PO	Rhizomes	nd	X		Poli et al. 2020a
Sarocladium strictum W. Gams	PO	Leaves	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Panno et al. 2013
Hypocreales i.s.						
Acremonium sp.	PO	Rhizomes	Pathotroph-Saprotroph-Symbiotroph/Animal Pathogen-Endophyte-	X		Panno et al. 2013

			Fungal Parasite-Plant Pathogen-Wood Saprotroph			
Acremonium fusidioides (Nicot) W. Gams	PO	Leaves	Pathotroph/Animal Pathogen	X		Garzoli 2013
Acremonium implicatum (J.C. Gilman & E.V. Abbott) Gams	PO	Roots	Pathotroph/Animal Pathogen	X		Panno et al. 2013
Acremonium minutisporum (Sukapure & Thirum.) Gams	PO	Matte	nd	X		Panno et al 2013
Acremonium tubakii W. Gams	PO	Matte	Pathotroph/Animal pathogen	X		Panno et al. 2013
Acremonium verruculosum W. Gams & Veenb.-Rijks	PO	Leaves	nd	X		Panno et al. 2013
Bionectriaceae						
Clonostachys rosea (J.C. Gilman & E.V. Abbott) Schr.	PO	Matte	Pathotroph/Fungal parasite	X		Panno et al.2013; Pasqualetti et al. 2020
Gliomastix murorum var. *murorum* (Corda) S. Hughes	PO	Matte	nd	X		Panno et al. 2013
Clavicipitaceae						
Keithomyces carneus (Duché & R. Heim) Samson, Luangsa-ard & Houbraken	PO	Rhizomes	nd	X		Poli et al. 2020a
Cordycipitaceae						
Beauveria bassiana (Bals.-Criv.) Vuill.	PO	Matte/Rhizomes/Roots	Pathotroph/Animal pathogen	X		Panno et al. 2013; Poli et al. 2020a

Cordyceps farinosa (Holmsk.) Kepler, B. Shrestha & Spatafora	PO	Matte	nd	X		Poli et al. 2020a
Engyodontium album (Limber) de Hoog	PO	Matte	Pathotroph/Animal pathogen	X		Poli et al. 2020a
Hypocreaceae						
Acrostalagmus luteoalbus (Link) Zare, W. Gams & Schroers	PO	Roots	Symbiotroph Endophyte	X		Poli et al 2020a
Trichoderma atroviride P. Karst.	PO	Matte	nd	X		Poli et al. 2020a
Trichoderma harzianum Rifai	PO	Rhizomes/Matte/Roots	Pathotroph/ Endophyte-Fungal Parasite-Plant Pathogen	X		Panno et al. 2013; Poli et al. 2020a
Trichoderma koningii Oudem	PO	Rhizomes	Pathotroph-Symbiotroph/Endophyte-Plant pathogen	X		Panno et al. 2013
Trichoderma sp.	PO	Rhizomes	Pathotroph-Saprotroph-Symbiotroph/Animal pathogen-Endophyte-Epiphyte-Fungal parasite-Plant pathogen-Wood saprotroph	X		Panno et al. 2013
Nectriaceae						
Cylindrocarpon didymum (Harting) Wollenw.	PO	Matte	nd	X		Panno et al. 2013
Fusarium sp.	PO	Leaves	nd	X		Garzoli 2013; Pasqualetti et al. 2020

Fusarium venenatum Nirenberg	PO	Leaves	nd	X		Poli et al. 2020a
Mariannaea humicola L. Lombard & Crous	PO	nd	nd	X		Pasqualetti et al. 2020
Nectria inventa Pethybr.	PO	Leaves	nd	X		Garzoli 2013
Ophiocordycipitaceae						
Purpureocillium lilacinum (Thom) Luangsa-ard, Houbraken, Hywel-Jones & Samson	PO	Rhizomes	nd	X		Poli et al. 2020a
Tolypocladium cylindrosporum W. Gams	PO	Rhizomes	nd	X		Poli et al. 2020a
Stachybotryaceae						
Alfaria dandenongensis Crous	PO	Matte	nd	X		Poli et al. 2020a
Albifimbria verrucaria (Alb. & Schwein.) L. Lombard & Crous	PO	Rhizomes	Pathotroph / Plant Pathogen	X		Panno et al. 2013
Paramyrothecium roridum Tode	PO	Rhizomes	Pathotroph / Plant Pathogen	X		Panno et al. 2013
Stachybotrys chlorohalonatus B. Andersen & Thrane	PO	nd	nd	X		Pasqualetti et al. 2020
Lulworthiales						
Lulworthiaceae						
Lulwoana sp.	PO	Roots	Saprotroph/Undefined saprotroph	X	X	Torta et al. 2015; Vohnik et al. 2016; Vohnik et al. 2019

Lulworthia sp.	PO	Matte	Saprotroph/Undefined saprotroph	X		Cuomo et al. 2985
Paralulworthia candida A. Poli, E. Bovio, L. Ranieri, G.C. Varese & V. Prigione	PO	Roots	nd	X		Poli et al 2021b
Paralulworthia elbensis A. Poli, E. Bovio, L. Ranieri, G.C. Varese & V. Prigione	PO	Roots	nd	X		Poli et al 2021b
Paralulworthia gigaspora A. Poli, E. Bovio, L. Ranieri, G.C. Varese & V. Prigione	PO	Rhizomes	nd	X		Poli et al. 2020a
Paralulworthia halima (Anastasiou) M. Gonçalves, A. Abreu & A. Alves	PO	Matte	nd	X		Cuomo et al. 1985
Paralulworthia mediterranea A. Poli, E. Bovio, L. Ranieri, G.C. Varese & V. Prigione	PO	Roots, Rhizomes	nd	X		Poli et al 2021b
Paralulworthia posidoniae A. Poli, E. Bovio, L. Ranieri, G.C. Varese & V. Prigione	PO	Rhizomes	nd	X		Poli et al. 2020a
Microascales						
Halosphaeriaceae						
Corollospora anglusa Abdel-Wahab & Nagah.	PO ZM	Rhizomes/Matte nd	nd	X		Poli et al. 2020a Abdel-Wahab 2009
Corollospora intermedia I. Schmidt	PO, Z	Leaves	nd	X		Cuomo et al. 1988
Corollospora mediterranea	PO	Rhizomes/Matte	nd	X		Poli et al. 2020a
Corollospora maritima Werderm.	PO, Z, CN	Leaves/Rhizomes	Symbiotroph/endophyte	X		Cuomo et al. 1988; Vohnik et al. 2016
Halosarpheia japonica Abdel-Wahab & Nagah.	PO	Roots	nd	X		Poli et al. 2020a

Microascaceae						
Cephalotrichum gorgonifer (Bainier) Sand.-Den., Gené & Guarro	PO	nd	nd	X		Pasqualetti et al. 2020
Doratomyces stemonitis (Pers.) Nees	PO	Roots	Pathotroph/Plant pathogen	X		Panno et al. 2013
Microascus paisii (Pollacci) Sand.-Den., Gené & Guarro	PO	nd	Pathotroph/Plant pathogen	X		Pasqualetti et al. 2020
Pseudallescheria boydii (Shear) McGinnis, A.A. Padhye & Ajello	PO	Rhizomes	Pathotroph/Animal pathogen	X		Garzoli 2013
Scedosporium apiospermum (Sacc.) Sacc. ex Castell. & Chalm.	PO	Rhizomes/Leaves	Pathotroph/Animal pathogen	X		Poli et al. 2020a
Scopulariopsis brevicaulis (Sacc.) Bainier	PO	nd	Pathotroph/Plant pathogen	X		Pasqualetti et al. 2020
Mymecridiales						
Mymecridiaceae						
Myrmecridium schulzeri var. *schulzeri* (Sacc.) Arza	PO	Leaves	nd	X		Panno et al. 2013
Sordariales						
Chaetomiaceae						
Chaetomium tectifimeti X. Wei Wang & Samson	PO	nd	nd	X		Pasqualetti et al. 2020
Dichotomopilus subfunicola (X.W. Wang & L. Cai) X. Wei Wang & Samson	PO	nd	nd	X		Pasqualetti et al. 2020

Lasosphaeriaceae						
Zopfiella ebriosa Guarro, P.F. Cannon & Aa	PO	Rhizomes	nd	X		Poli et al. 2020a
Torpedosporales						
Juncigenaceae						
Elbamycella rosea A. Poli, E. Bovio, V. Prigione & G.C. Varese	PO	Leaves/Matte	nd	X		Poli et al. 2019
Tricosphaeriales						
Tricosphaeriaceae						
Nigrospora oryzae (Berk. & Broome) Petch	PO	Rhizomes	Pathotroph-Saprotroph/ Plant Pathogen			Poli et al. 2020a
Xylariales						
Apiosporaceae						
Apiospora arundinis (Corda) Pintos & P. Alvarad	PO	Leaves/Rhizomes	nd	X		Panno et al. 2013; Poli et al. 2020a
Apiospora montagnei Sacc.	PO	Matte	nd	X		Panno et al. 2013
Apiospora sacchari (Speg.) Pintos & P. Alvarado	PO	Matte	nd	X		Panno et al. 2013
Arthrinium phaeospermum (Corda) M.B. Ellis	PO	Matte	Symbiotroph/Endophyte	X		Panno et al. 2013
Arthrinium sphaerospermum Fuckel	PO	Rhizomes	nd	X		Panno et al. 2013

Arthrinium sp.	PO	Rhizomes	nd	X		Poli et al. 2020a
BASIDIOMYCOTA						
AGARICOMYCETES						
Agaricales						
Niaceae						
Nia vibrissa R.T. Moore & Meyers	CN	nd	nd	X		Cuomo et al. 1988
Omphalotaceae						
Rhodocollybia butyracea (Bull.) Lennox	PO	Roots	nd		X	Vohnik et al. 2019
Schizophyllaceae						
Schizophyllum commune Fr.	PO	Roots/Matte	Pathotroph-Saprotroph/Animal Pathogen-Endophyte-Wood Saprotroph	X		Panno et al. 2013; Poli et al. 2020a
Tricholomataceae						
Lepista nuda **(Bull.) Cooke**	PO	Roots	Saprotroph/Leaf saprotroph		X	Vohnik et al. 2019
Hymenochaetales						
Hymenochaetaceae						
Fuscoporia sp.	PO	Roots	Saprotroph/Undefined saprotroph	X		Vohnik et al. 2016
Polyporales						

Irpicaceae						
Irpex lacteus (Fr.) Fr.	PO	Roots/Matte	nd	X		Poli et al. 2020a
Meruliaceae						
Bjerkandera adusta (Willd.) P. Karst.	PO	Matte	nd	X		Poli et al. 2020a
Phlebia tremellosa (Schrad.) Nakasone & Burds	PO	Roots	nd		X	Vohnik et al. 2019
Phanerochaetaceae						
Porostereum spadiceum (Pers.) Hjortstam & Ryvarden	PO	Roots	nd	X		Poli et al. 2020a
Polyporaceae						
Cerrena unicolor (Bull.) Murrill	PO	Rhizomes	Pathotroph/Plant pathogen	X		Poli et al. 2020a
EXOBASIDIOMYCETES						
Malassezia globosa Midgley, E. Guého & J. Guillot	ZM	Leaves	nd		X	Ettinger et al. 2021
Malassezia restricta E. Guého, J. Guillot & Midgley	ZM	Leaves/Roots	nd		X	Ettinger et al. 2021
Malassezia sp.	PO	Roots	nd		X	Vohnik et al. 2019
MICROBOTRYOMYCETES						
Sporidiobolales						

Sporidiobolaceae						
Rhodotorula diobovata (S.Y. Newell & I.L. Hunter) Q.M. Wang, F.Y. Bai, M. Groenew. & Boekhout	PO	Rhizomes	nd	X		Poli et al. 2020a
Rhodotorula mucilaginosa (A. Jörg.) F.C. Harrison	PO	Rhizomes	Pathotroph/Animal pathogen	X		Garzoli 2013
Sporobolomyces roseus Kluyver & C.B. Niel	PO	Leaves	nd	X		Panno et al. 2013
TREMELLOMYCETES						
Tremellales						
Cryptococcaceae						
Cryptococcus sp**.**	ZM	Leaves	Pathotroph-Saprotroph-Symbiotroph/ Animal Pathogen-Endophyte-Epiphyte-Undefined Saprotroph		X	Ettinger et al. 2021
Tremellaceae						
Dioszegia sp.	PO	Leaves	nd	X		Panno et al. 2013 Poli et al. 2020a
Trichosporonales						
Trichosporonaceae						
Apiotrichum lignicola (Diddens) Yurkov & Boekhout	PO	Rhizomes	nd	X		Panno et al. 2013
USTILAGINOMYCETES						
Ustilaginales						

Ustilaginaceae						
Pseudozyma prolifica Bandoni	PO	Roots	nd	X		Poli et al. 2020a
WALLEMIOMYCETES						
Wallemiales						
Wallemiaceae						
Wallemia sebi (Fr.) Arx	PO	Leaves/Matte	nd	X		Panno et al. 2013; Poli et al. 2020a
CHYTRIDIOMYCOTA						
CHYTRIDIOMYCETES						
Chytridiales						
Chytridiaceae						
Chytridium sp.	ZM	Roots	Pathotroph/Plant pathogen		X	Ettinger et al. 2021
LABULOMYCETES						
Labulomycetales						
Labulomycetaceae						
Labulomyces sp.	PO ZM	Roots Leaves	nd		X	Vohnik et al. 2019 Ettinger et al. 2021
MUCOROMYCOTA						
MUCOROMYCETES						

Mucorales						
Cunninghamellaceae						
Cunninghamella bertholletiae Stadel	PO	Rhizomes/Matte	nd	X		Poli et al. 2020a

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628 **Table 2.** Checklist of fungal taxa associated with Mediterranean seaweeds. **Brown algae**: CC = *Cystoseira crinata*; CM = *Cystoseira mediterranea*;
629 CST= *Cystoseira stricta*; CS = *Calpomenia sinuosa*; CV = *Cladostephus verticillatus*; CY = *Cystoseira* sp.; DD = *Dictyota dichotoma*; DM =
630 *Dictyopteris membranacea*; DF = *Dilophus fascicola*; DS = *Dilophus spiralis*; EC = *Ectocarpus confervoides*; FV = *Fucus vesiculosus*; HT =
631 *Halimeda tuna*; PP = *Padina pavonica*; SM = *Sargassum muticum*; SS = *Stypocaulon scoparium*; SV = *Sargassum vulgare*; TA = *Taonia atomaria*.
632 **Green algae**: CL = *Chaetomorpha linum*; CR = *Caulerpa racemosa*; CT = *Chondria tenuissima*; CTO = *Codium tomentosum*; FP = *Flabellia*
633 *petiolata*; U = *Ulva* sp.; UC = *Ulva curvata*; UN = *Ulva neapolitana*; UR = *Ulva rigida*. **Red algae**: AT = *Asparagopsis taxiformis*; C = *Corallina*
634 sp.; GT = *Gigartina teedi*; LO = *Laurencia obtusa*; P = *Peyssonnelia* sp.; PC = *Pterocladia capillacea*; SC = *Sphaerococcus coronopifolius*
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Taxon	Host	Type of Alga	Trophic mode/Guild	Culture dependent	Culture independent	Reference
ASCOMYCOTA						
Devriesia sp.	FP	Green	Pathotroph/Animal pathogen	X		Gnavi et al. 2017
Knufia karalitana Isola & Onofri	SM	Brown	nd	X		Garzoli 2013
Knufia petricola (U. Wollenzien & de Hoog) Gorbushina & Gueidan	FP, SM	Green, Brown	nd	X		Garzoli 2013; Gnavi et al. 2017
Neodevriesia lagerstroemiae (Crous & M.J. Wingf.) Crous	PP	Brown	nd	X		Garzoli et al. 2018
Sirococcus conorum Sacc. & Roum	FV	Brown	nd	X		Garzoli 2013
DOTHIDEOMYCETES						
Botryospheriales						
Botryospheriaceae						

Diplodia sp.	DM	Brown	Pathotroph-Saprotroph-Symbiotroph/Epiphyte-Plant Pathogen-Wood Saprotroph	X		Cuomo et al. 1988
Capnodiales						
Dissoconiaceae						
Zasmidium strelitziae (Arzanlou, W. Gams & Crous) Videira & Crous	PP	Brown	nd	X		Garzoli et al. 2018
Cladosporiales						
Cladosporiaceae						
Cladosporium sp.	PP, CR, UR, C, P, DD, HT, SS	Brown, Greeen, Red	nd	X		Garzoli 2013; Garzoli et al. 2018
Cladosporium allicinum (Fr. : Fr.) Bensch, U. Braun & Crous	FP, PP, DD, SS	Brown, Green	nd	X		Garzoli 2013; Gnavi et al. 2017; Garzoli et al. 2018; Pasqualetti et al. 2020
Cladosporium cladosporioides (Fresen.) G.A. de Vries	AT, FP, PP	Brown, Green, Red	Pathotroph-Symbiotroph /Endophyte-Epiphyte-Plant Pathogen	X		Garzoli et al. 2014; Gnavi et al 2017; Garzoli et al 2018
Cladosporium delicatulum Cooke, Grevillea	PP	Brown	nd	X		Garzoli et al. 2018
Cladosporium halotolerans Zalar, de Hoog & Gunde-Cim.	PP, CR	Brown, Green	Pathotroph/Animal pathogen	X		Garzoli 2013; Garzoli et al. 2018
Cladosporium herbarum (Pers.) Link	FP	Green	Pathotroph-Saprotroph/ Plant Pathogen-Wood Saprotroph	X		Gnavi et al. 2017

Cladosporium iranicum Bensch, Crous & U. Braun	PP	Brown	nd	X		Garzoli et al. 2018
Cladosporium macrocarpum Preuss	CM	Brown	nd	X		Cuomo et al. 1988
Cladosporium pseudocladosporioides Bensch, Crous & U. Braun	AT, PP, SM	Brown, Red	nd	X		Garzoli 2013; Garzoli et al. 2014; Garzoli et al. 2018
Cladosporium ramotenellum K. Schub., Zalar, Crous & U. Braun	PP	Brown	nd	X		Garzoli et al. 2018
Cladosporium sphaerospermum Penz.	FP, PP, SS	Brown, Green	Symbiotroph/Endophyte	X		Garzoli PhD; Gnavi et al 2017; Garzoli et al 2018
Cladosporium subtilissimum K. Schub., Dugan, Crous & U. Braun	PP	Brown	nd	X		Garzoli et al. 2018
Cladosporium tenellum K. Schub., Zalar, Crous & U. Braun	UR	Brown	nd	X		Garzoli 2013
Cladosporium tenuissimum Cooke	SM	Brown	Pathotroph-Symbiotroph/Endophyte-Plant pathogen	X		Garzoli 2013
Cladosporium uredinicola Speg.	PP	Brown	nd	X		Garzoli et al. 2018
Cladosporium xylophilum Bensch, Shabunin, Crous & U. Braun	PP, CTO	Brown, Green	nd	X		Garzoli 2013; Garzoli et al. 2018
Toxicocladosporium strelitziae P.W. Crous	PP	Brown	nd	X		Garzoli et al. 2018
Verrucocladosporium dirinae K. Schub., Aptroot & Crous	FP	Brown	Pathotroph/Lichen parasite	X		Gnavi et al. 2017
Dothidelaes						
Dothideales i.s.						

Biatriospora sp.	FP	Green	nd	X		Gnavi et al. 2017
Dothioraceae						
Aureobasidium pullulans (De Bary) G. Arnaud ex Cif., Ribaldi & Corte	FP, PP	Brown, Green	Pathotroph-Symbiotroph/ Animal Pathogen-Endophyte-Epiphyte-Plant Pathogen	X		Gnavi et al. 2017; Garzoli et al. 2018
Sydowia polyspora (Bref. & Tavel) E. Müll	UR, SM	Brown, Green	Pathotroph/Plant pathogen	X		Garzoli 2013
Mycosphaerellales						
Mycosphaerellaceae						
Ramularia eucalypti Crous	FP	Green	nd	X		Gnavi et al. 2017
Pleosporales						
Aaosphaeria arxii (Aa) Aptroot	PP	Brown	nd	X		Garzoli et al. 2018
Ochrocladosporium frigidarii Crous & U. Braun	PP	Brown	nd	X		Garzoli et al. 2018
Phoma sp.	EC, TA, UC	Brown, Green	nd	X		Cuomo et al. 1988
Arthopyreniaceae						
Arthopyrenia salicis A. Massal.	FP	Green	nd	X		Gnavi et al. 2017
Cucurbitariaceae						
Pyrenochaeta rubi-idaei Cavara	DM	Brown	nd	X		Cuomo et al. 1988

Dictyosporiaceae						
Paradendryphiella salina (G.K. Sutherland) Woudenb. & Crous	CC, CL, LO, CST, SV, UN, UR	Brown, Green	nd	X		Cuomo et al. 1988
Didymellaceae						
Epicoccum nigrum Link	CTO, UR, SS	Brown, Green	Pathotroph-Symbiotroph/Endophyte-Lichen Parasite-Plant Pathogen	X		Garzoli 2013
Didymosphaeriaceae						
Paraconiothyrium sp.	PP	Brown	nd	X		Garzoli et al. 2018
Paraconiothyrium variabile Riccioni, Damm, Verkley & Crous	PP	Brown	nd	X		Garzoli et al. 2018
Paraphaeosphaeria neglecta Verkley, Riccioni & Stielow	PP	Brown	nd	X		Garzoli et al. 2018
Lophiotremataceae						
Lophiotrema rubi (Fuckel) Y. Zhang ter, C.L. Schoch & K.D. Hyde	FP, PP, CY	Brown, Green	nd	X		Garzoli 2013; Gnavi et al. 2017; Garzoli et al. 2018
Massarinaceae						
Massarina sp.	FP	Green	Pathotroph-Saprotroph/ Plant Pathogen-Undefined Saprotroph	X		Gnavi et al. 2017
Microsphaeropsidaceae						

Microsphaeropsis olivacea (Bonord.) Höhn	PP	Brown	Pathotroph-Symbiotroph/Pathotroph-Symbiotroph	X		Garzoli et al. 2018
Phaeosphaeriaceae						
Phaeosphaeria sp.	PP, P	Brown, Red		X		Garzoli 2013; Garzoli et al. 2018
Pleosporaceae						
Alternaria sp.	CST; AT, PP, CR, CTO, UR, FV, SM, SS	Brown, Green, Red	Pathotroph-Saprotroph-Symbiotroph/ Animal Pathogen-Endophyte-Plant Pathogen-Wood Saprotroph	X		Cuomo et al. 1988; Garzoli 2013; Garzoli et al. 2014; Garzoli et al. 2018
Alternaria abundans (E.G. Simmons) Woudenb. & Crous	CR	Green	nd	X		Garzoli 2013
Alternaria alternata (Fr.) Keissl.	FP, DD	Brown, Green	nd	X		Gnavi et al. 2017; Pasqualetti et al. 2020
Alternaria chlamydospora Mouch**.**	FV, DD	Brown, Green	nd	X		Garzoli 2013; Pasqualetti et al. 2020
Alternaria consortialis (Thüm.) J.W. Groves & S. Hughes	DD	Brown	nd	X		Garzoli 2013
Alternaria maritima-like	DM, CV, UN, UC	Brown, Green	nd	X		Cuomo et al. 1988

Alternaria metachromatica E.G. Simmons	PP	Brown	nd	X		Garzoli et al. 2018
Alternaria tenuissima (Kunze) Wiltshire	CTO, FV	Brown, Green	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Garzoli 2013
Pleospora sp.	DM,PC, UC, CL	Green	Pathotroph-Saprotroph-/Endophyte-Lichen Parasite-Plant pathogen-Undefined Saprotroph	X		Cuomo et al. 1988
Pleospora paludiscirpi E.G. Simmons	SS	Brown	nd	X		Garzoli 2013
Stemphylium sp.	TA	Brown	nd	X		Cuomo et al. 1988
Stemphylium vesicarium (Wallr.) E.G. Simmons	DD, FV, SS	Brown	Pathotroph/Plant pathogen	X		Garzoli 2013; Pasqualetti et al. 2020
Pyrenochaetopsidaceae						
Pyrenochaetopsis sp.	FP, PP	Brown, Greem	Pathotroph-Saprotroph-Symbiotroph/Endophyte-Lichen Parasite-Undefined Saprotroph	X		Gnavi et al. 2017; Garzoli et al. 2018
Pyrenochaetopsis microspora (Gruyter & Boerema) Gruyter, Aveskamp & Verkley	PP	Brown	Pathotroph-Symbiotroph/ Endophyte-Lichen Parasite	X		Garzoli et al. 2018
Roussoellaceae						
Neoroussoella lignicola Poli, Bovio, Prigione & Varese	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2020b
Roussoella margidorensis Bovio, Prigione, Poli & Varese	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2020b

Roussoella mediterranea Poli, Bovio, Prigione & Varese	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2020b
Roussoella padinae Bovio, Poli, Prigione & Varese	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2020b
Sporomiaceae						
Preussia sp.	DD	Brown	Saprotroph/Undefined saprotroph			Pasqualetti et al. 2020
Thyridariaceae						
Parathyridaria flabelliae Bovio, Poli, Prigione & Varese	FP, PP	Brown, Green	nd	x		Gnavi et al. 2017; Garzoli et al. 2018; Poli et al. 2020b
Parathyridaria robiniae Mapook, Camporesi and Hyde	PP	Brown	nd	x		Garzoli et al. 2018; Poli et al. 2020b
Parathyridaria tyrrhenica Poli, Prigione, Bovio & Varese	FP, PP	Brown, Green	nd			Gnavi et al. 2017; Garzoli et al. 2018; Poli et al. 2020b
Parathyridariella dematiacea Prigione, Poli, Bovio & Varese	FP, PP	Brown, Green	nd	X		Gnavi et al. 2017; Garzoli et al. 2018; Poli et al. 2020b
EUROTIOMYCETES						
Eurotiales						
Aspergillaceae						

Aspergillus sp.	DD	Brown	nd	X		Pasqualetti et al. 2020
Aspergillus conicus Blochwitz	PP	Brown	nd	X		Garzoli et al. 2018
Aspergillus flavipes (Bainier & Sartory) Thom & Church	SS	Brown	nd	X		Garzoli 2013
Aspergillus flavus Link	SC	Red	nd	X		Pasqualetti et al. 2020
Aspergillus heyangensis Z.T. Qi, Z.M. Sun & Yu X. Wang	PP	Brown	nd	X		Garzoli et al. 2018
Aspergillus insuetus (Bainier) Thom & Church	PP	Brown	Pathotroph/Animal pathogen	X		Garzoli et al. 2018
Aspergillus insulicola Montem. & A.R. Santiago	PP	Brown	Pathotroph/Animal pathogen	X		Garzoli et al. 2018
Aspergillus pseudoterreus S.W. Peterson, Samson & Varga	UR	Green	nd	X		Garzoli 2013
Aspergillus spelaeus A. Nováková, Hubka, M. Kolařík, S.W. Peterson	SC	Red	nd	X		Pasqualetti et al. 2020
Aspergillus fumigatus Fresen.	PP	Brown	Pathotroph-Saprotroph/Animal pathogen	X		Garzoli et al. 2018
Aspergillus terreus Thom	PP	Brown	nd			Garzoli et al. 2018
Aspergillus versicolor (Vuill.) Tirab.	CR	Green	Pathotroph/Animal pathogen	X		Garzoli 2013

Eurotium rubrum Jos. König et al	AT	Red	nd	X		Garzoli et al. 2014
Penicillium antarcticum A.D. Hocking & C.F. McRae	FP, PP	Brown, Green	nd	X		Gnavi et al. 2017; Garzoli et al. 2018
Penicillium atramentosum Thom	FP	Green	nd	X		Gnavi et al. 2017
Penicillium brevicompactum Dierckx	FP, PP	Brown, Green	Symbiotroph/erndophyte	X		Gnavi et al. 2017; Gazoli et al. 2018
Penicillium caseifulvum Lund, Filt. & Frisvad	PP	Brown	nd	X		Garzoli et al. 2018
Penicillium chrysogenum Thom	FP	Green	Pathotroph/Plant pathogen	X		Gnavi et al. 2017
Penicillium citrinum Thom	PP, CR	Brown, Green	nd			Garzoli 2013; Garzoli et al. 2018
Penicillium commune Thom	FP	Green	Pathotroph/Animal pathogen	X		Gnavi et al. 2017
Penicillium crustosum Thom	FP	Green	nd	X		Gnavi et al. 2017
Penicillium expansum Link	FP	Green	Pathotroph/Plant pathogen	X		Gnavi et al. 2017
Penicillium palitans Westling	FP	Green	Saprotroph/Wood saprotroph	X		Gnavi et al. 2017
Penicillium roseopurpureum Dierckx	PP	Brown	nd	X		Garzoli et al. 2018
Penicillium simplicissimum (Oudem.) Thom	FP	Green	Saprotroph/Wood saprotroph	X		Gnavi et al. 2017
Penicillium solitum Westling	FP	Green	nd	X		Gnavi et al. 2017
Penicillium spinulosum Thom	PP	Brown	Pathotroph/Animal pathogen	X		Garzoli et al. 2018
Penicillium steckii K.M. Zalessky	PP	Brown	nd	X		Garzoli et al. 2018

Thermoascaceae						
Phialemonium inflatum (Burnside) Dania García, Perdomo, Gené, Cano & Guarro	PP	Brown	Saprotroph/Wood Saprotroph	X		Garzoli et al. 2018
Trichomaceae						
Talaromyces variabilis (Sopp) Samson, Yilmaz, Frisvad & Seifert	FP	Green	nd			Gnavi et al. 2017
Chaetothyriales						
Herpotrichiellaceae						
Exophiala aquamarina de Hoog, Vicente, Najafzadeh, Harrak, Badali, Seyedmousavi & Nyaoke	PP	Brown	Pathotroph/Animal pathogen	X		Garzoli et al. 2018
Exophiala angulospora Iwatsu, Udagawa & T. Takase	DD	Brown	nd	X		Garzoli 2013
LEOTIOMYCETES						
Helotiales						
Helotiales i.s.						
Lemonniera sp.	PP	Brown	Saprotroph/Undefined saprotroph			Garzoli et al. 2018
Pseudocercosporidium carotae (Årsvoll) de Hoog & Oorschot	FP	Green	nd	X		Gnavi et al. 2017
Hyaloscyphaceae						
Lachnum sp.	PP	Brown	Saprotroph/Undefined saprotroph	X		Garzoli et al. 2018
Ploettnerulaceae						

Cadophora luteo-olivacea (J.F.H. Beyma) T.C. Harr. & McNew	DD	Brown	nd	X		Garzoli 2013
Sclerotiniaceae						
Botrytis cinerea Pers	FP	Green	nd	X		Gnavi et al. 2017
Thelebolales						
Thelebolaceae						
Thelebolus balaustiformis Bovio, Garzoli, A. Poli, Prigione & Varese	PP	Brown	nd	X		Bovio et al. 2018; Garzoli et al. 2018
Thelebolus stercoreus Tode	PP	Brown	nd	X		Bovio et al. 2018; Garzoli et al. 2018
SORDARIOMYCETES						
Amphisphaeriales						
Amphisphaeriaceae						
Pestalotia olivacea Guba	PP	Brown	nd	X		Garzoli et al. 2018
Diaporthales						
Diaporthaceae						
Diaporthe sp.	PP	Brown	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Garzoli et al. 2018
Gnomoniaceae						
Apiognomonia sp.	PP	Brown	nd			Garzoli et al. 2018
Ophiognomonia sp.	PP	Brown	nd	X		Garzoli et al. 2018

Glomerellales						
Plectosphaerellaceae						
Gibellulopsis nigrescens (Pethybr.) Zare, W. Gams & Summerb.	FP, PP	Brown, Green	nd	X		Gnavi et al. 2017; Garzoli et al. 2018
Plectosphaerella cucumerina (Lindf.) W. Gams	PP	Brown	Pathotroph/Animal pathogen	X		Garzoli et al. 2018
Verticillium sp.	DD	Brown	Pathotroph-Symbiotroph/Endophyte-Fungal Parasite-Plant Pathogen	X		Garzoli 2013
Hypocreales						
Sarocladiaceae						
Sarocladium sp.	PP	Brown	nd	X		Garzoli et al. 2018
Sarocladium glaucum (W. Gams) Summerbell	PP	Brown	Pathotroph/Animal pathogen	X		Garzoli et al. 2018
Sarocladium strictum W. Gams	FP	Green	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Gnavi et al. 2017
Hypocreales i.s.						
Acremonium sp.	CTO, UR, P, SS	Brown, Green, Red	Pathotroph-Saprotroph-Symbiotroph/Animal Pathogen-Endophyte-Fungal Parasite-Plant Pathogen-Wood Saprotroph	X		Garzoli 2013
Acremonium alternatum Link	FV, SS	Brown, Green	Saprotroph/Wood saprotrph	X		Garzoli 2013
Acremonium sclerotigenum (Moreau & R. Moreau ex Valenta) W. Gams	FP, PP	Brown, Green	nd	X		Gnavi et al. 2017; Garzoli et al. 2018

Acremonium tumulicola *Kiyuna, An, Kigawa & Sugiyama*	FP	Green	nd	X		Gnavi et al. 2017
Acremonium vitellinum W. Gams	PP	Brown	nd	X		Garzoli et al. 2018
Brunneomyces brunnescens (W. Gams) Giraldo	PP, C	Brown, Red	Pathotroph/Animal Pathogen	X		Garzoli 2013; Garzoli et al. 2018
Emericellopsis maritima Beliakova	FV, SS	Brown	nd	X		Garzoli 2013
Emericellopsis minima Stolk	FP	Green	nd	X		Gnavi et al. 2017
Emericellopsis pallida Beliakova	FV	Brown	nd	X		Garzoli 2013
Furcasterigmium furcatum *(Gams) Giraldo López & Crous*	PP	Brown	nd	X		Garzoli et al. 2018
Parasarocladium breve (Sukapure & Thirum.) Summerb., J.A. Scott, Guarro & Crous	PP	Brown	nd	X		Gnavi et al. 2017
Bionectriaceae						
Clonostachys sp.	PP	Brown	nd	X		Garzoli et al. 2018
Clonostachys rosea (J.C. Gilman & E.V. Abbott) Schr.	PP, SS	Brown	Pathotroph/Fungal parasite	X		Garzoli 2013; Garzoli et al. 2018
Gliomastix masseei (Sacc. & Trotter) Matsush.	FP	Green	nd	X		Gnavi et al. 2017
Gliomastix murorum (Corda) S. Hughes	DD	Brown	nd	X		Garzoli 2013
Valsonectria pulchella Speg.	FP	Green	nd	X		Gnavi et al. 2017
Clavicipitaceae						

Metarhizium granulomatis (Sigler) Kepler, S.A. Rehner & Humbe	PP	Brown	nd	X		Garzoli et al. 2018
Pochonia chlamydosporia (Goddard) Zare & W. Gams	PP	Brown	nd	X		Garzoli et al. 2018
Cordycipitaceae						
Amphichorda felina (DC.) Fr	CR	Green	nd	X		Garzoli 2013
Beauveria bassiana (Bals.-Criv.) Vuill.	FP, P	Green, Red	Pathotroph/Animal pathogen	X		Garzoli 2013; Gnavi et al. 2017
Simplicillium lamellicola (F.E.V. Sm.) Zare & W. Gams	FV, SS	Brown	nd	X		Garzoli 2013
Hypocreaceae						
Acrostalagmus luteoalbus (Link) Zare, W. Gams & Schroers	FP, PP	Brown, Green	Symbiotroph Endophyte	X		Gnavi et al. 2017; Garzoli et al. 2018
Trichoderma aureoviride Rifai	PP	Brown	Symbiotroph/Endophyte	X		Garzoli et al. 2018
Trichoderma harzianum Rifai	PP	Brown	Pathotroph/ Endophyte-Fungal Parasite-Plant Pathogen	X		Garzoli et al. 2018
Trichoderma koningii Oudem	PP	Brown	Pathotroph-Symbiotroph/Endophyte-Plant pathogen	X		Garzoli et al. 2018
Trichoderma lixii (Pat.) P. Chaverri	DD	Brown	nd	X		Pasqualetti et al. 2020
Trichoderma sp.	PP, CR	Brown, Green	Pathotroph-Saprotroph-Symbiotroph/Animal pathogen-Endophyte-Epiphyte-Fungal	X		Garzoli 2013; Garzoli et al. 2018

			parasite-Plant pathogen-Wood saprotroph			
Nectriaceae						
Fusarium sp.	P, HT	Brown, Red	nd	X		Garzoli 2013
Fusarium incarnatum-equiseti species complex	FV	Green	nd	X		Garzoli 2013
Fusarium oxysporum Schltdl.	PP	Brown	nd	X		Garzoli et al. 2018
Nectria inventa Pethybr.	CTO, P, CY	Brown, Green, Red	nd	X		Garzoli 2013
Volutella ciliata (Alb. & Schwein.) Fr.	CTO, UR	Green	nd	X		Garzoli 2013
Niessliaceae						
Sedecimiella taiwanensis K.L. Pang, Alias & E.B.G. Jones	FP	Green	nd	X		Gnavi et al. 2017
Ophiocordycipitaceae						
Purpureocillium lilacinum (Thom) Luangsa-ard, Houbraken, Hywel-Jones & Samson	UR, P, HT	Brown, Green, Red	nd	X		Garzoli 2013
Stachybotryaceae						
Stachybotrys chartarum (Ehrenberg) S. Hughes	DS, DF, DD, TA,U, SW, CS; PP, CR, UR, SS	Brown, Green	Saprotroph/Wood saprotroph			Cuomo et al. 1988; Garzoli 2013; Garzoli et al. 2018

Stachybotrys chlorohalonatus B. Andersen & Thrane	DD	Brown	nd	X		Pasqualetti et al. 2020
Myrothecium inundatum Tode	PP	Brown	nd	X	Garzoli et al. 2018	Garzoli et al. 2018
Lulworthiales						
Lulworthiaceae						
Lulworthia sp.	U, UN, UR, UC	Green	Saprotroph-Undefined saprotroph	X		Cuomo et al. 1988
Paralulworthia halima (Anastasiou) M. Gonçalves, A. Abreu & A. Alves	DF, GT	Brown, Red	nd	X		Cuomo et al. 1988
Microascales						
Microscales i.s.						
Cephalotrichiella penicillata Crous	FP	Green	nd	X		Gnavi et al. 2017
Halosphaeriaceae						
Corollospora maritima Werderm.	CM, UC, UR, UN, U; C	Brown, Green, Red	Symbiotroph/endophyte	X		Cuomo et al. 1988; Garzoli 2013
Corollospora intermedia I. Schmidt	CT, HT	Brown, Green	nd	X		Cuomo et al. 1988
Microascaceae						
Microascus cirrosus Curzi	FP	Green	Pathotroph/Animal pathogen	X		Gnavi et al. 2017
Microascus trigonosporus C.W. Emmons & B.O. Dodge	FP	Green	Saprotroph/Undefined saprotroph	X		Gnavi et al. 2017

Wardomycopsis humicola (G.L. Barron) Udagawa & Furuya	PP	Brown	nd	X		Garzoli et al. 2018
Ophiostomatales						
Ophiostomataceae						
Sporothrix inflata de Hoog	PP	Brown	Pathotroph/Plant pathogen	X		Garzoli et al. 2018
Sordariales						
Chaetomiaceae						
Botryotrichum murorum (Corda) X. Wei Wang & Samson	CTO	Green	nd	X		Garzoli 2013
Chaetomium bostrychodes Zopf	PP	Brown	nd	X		Garzoli et al. 2018
Chaetomium fimeti Fuckel	DD, SC	Brown, Red	nd	X		Pasqualetti et al. 2020
Chaetomium globosum Kunze	FP	Green	Pathotroph-Saprotroph-Symbiotroph/ Dung Saprotroph-Endophyte-Epiphyte-Wood Saprotroph	X		Gnavi et al. 2017
Corynascus verrucosus Stchigel, Cano & Guarro	FP	green	nd	X		Gnavi et al. 2017
Xylariales						
Apiosporaceae						
Apiospora arundinis (Corda) Pintos & P. Alvarad	PP, SC	Brown, Red	nd	X		Garzoli et al. 2018; Pasqualetti et al. 2020
Apiospora montagnei Sacc.	FP, SS	Brown, Green	nd	X		Gnavi et al. 2017

Apiospora marii (Larrondo & Calvo) Pintos & P. Alvarad	FP, PP	Brown, Green,	nd	X		Gnavi et al. 2017; Garzoli et al. 2018
Arthrinium sphaerospermum Fuckel	FP, PP	Brown, Green	nd	X		Gnavi et al. 2017; Garzoli et al. 2018
Diatrypaceae						
Libertella blepharis A.L. Sm.	PP	Brown	Pathotroph/Plant pathogen	X		Garzoli et al. 2018
BASIDIOMYCOTA						
AGARICOMYCETES						
Agaricales						
Psathyrellaceae						
Coprinellus sp.	PP	Brown	nd	x		Garzoli et al. 2018; Poli et al. 2018
Coprinellus radians (Desm.) Vilgalys	FP	Green	nd	X		Gnavi et al. 2017; Poli et al. 2018
Russulales						
Peniophoraceae						
Peniophora cinerea (Pers.) Cooke	FP	Green	Saprotroph/Wood saprotroph	X		Gnavi et al. 2017; Poli et al. 2018
Peniophora incarnata (Pers.) P. Karst	PP	Brown	nd			Garzoli et al. 2018; Poli et al. 2018
Schizophyllaceae						

Schizophyllum commune Fr.	FP, PP	Brown, Green	Pathotroph-Saprotroph/Animal Pathogen-Endophyte-Wood Saprotroph	X		Gnavi et al. 2017; Garzoli et al. 2018; Poli et al. 2018
Polyporales						
Meruliaceae						
Bjerkandera adusta (Willd.) P. Karst.	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2018
CYSTOBASIDIOMYCETES						
Buckleyzymales						
Buckleyzymaceae						
Rhodotorula aurantiaca (Saito) Lodder	PP	Brown	Symbiotroph/Endophyte	X		Garzoli et al. 2018; Poli et al. 2018
MICROBOTRYOMYCETES						
Sporidiobolales						
Sporidiobolaceae						
Rhodotorula graminis Di Menna	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2018
WALLEMIOMYCETES						
Wallemiales						
Wallemiaceae						

Wallemia sebi (Fr.) Arx	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2018
MORTIERELLOMYCOTA						
MORTIERELLOMYCETES						
Mortierellales						
Mortierellaceae						
Mortierella alpina Peyronel	PP	Brown	nd			Garzoli et al. 2018

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647 **Table 3.** Checklist of fungal taxa associated with woods in the Mediterranean Sea. DW = driftwood; SW = submerged wood;
648 TB = test blocks; SWT = submerged wood test panels

Taxon	Host	Trophic mode/Guild	Culture dependent	Culture independent	Reference
ASCOMYCOTA					
Cremasteria cymatilis Meyers & R.T. Moore	DW	nd	X		Cuomo et al. 1988
Crinigera maritima Schmidt	DW, TB	nd	X		Cuomo et al. 1988
DOTHIDEOMYCETES					
Piricauda pelagica T. Johnson	DW, TB	Symbiotroph/Endophyte	X		Cuomo et al. 1988
Cladosporiales					
Cladosporiaceae					
Cladosporium halotolerans Zalar, de Hoog & Gunde-Cim.	SW	Pathotroph/Animal pathogen	X		Garzoli et al. 2015
Dothideales					
Paraliomyces lentifer Kohlm.	DW, TB	nd	X		Cuomo et al. 1988
Kirschsteiniotheliales					
Kirschsteiniotheliaceae					
Halokirschsteiniothelia maritima (Linder) Boonmee & K. D. Hyde	DW, TB	nd	X		Cuomo et al. 1988

Pleosporales					
Phoma sp.	DW	nd	X		Cuomo et al. 1988; Garzoli 2013
Dictyosporiaceae					
Dictyosporium pelagicum (Linder) G.C. Hughes ex E.B.G. Jones	DW, TB	nd	X		Cuomo et al. 1988
Paradendryphiella salina (G.K. Sutherland) Woudenb. & Crous	DW, TB	nd	X		Cuomo et al. 1988
Leptosphaeriaceae					
Leptosphaeria marina Ellis & Everh.	DW, TB	nd	X		Cuomo et al. 1988
Phaeosphaeria orae-maris (Linder) Khashn. & Shearer	DW, TB	nd	X		Cuomo et al. 1988
Periconiaceae					
Periconia prolifica Anastasiou	DW, TB	Pathotroph-Symbiotroph/ Endophyte-Plant pathogen	X		Cuomo et al. 1988
Pleosporaceae					
Aletrnaria maritima-like	DW, TB	nd	X		Cuomo et al. 1988
Alternaria tenuissima (Kunze) Wiltshire	DW, SW	Pathotroph-Symbiotroph/ Endophyte-Plant pathogen	X		Garzoli et al. 2015
Pleospora sp.	DW	Pathotroph-Saprotrph/	X		Cuomo et al. 1988

		Endophyte-Lichen parasite-Plant pathogen-undefined saprotropj			
Stemphylium sp.	DW	Pathotroph-Saprotroph/ Plant pathogen-Wood saprotroph	X		Cuomo et al. 1988
Venturiales					
Sympoventuriaceae					
Paradendryphiella arenariae (Nicot) Woudenb. & Crous	DW	nd	X		Garzoli et al. 2015
EUROTIOMYCETES					
Eurotiales					
Aspergillaceae					
Aspergillus ochraceus K. Wilh.	DW, SW	Pathotroph/Animal pathogen	X		Garzoli et al. 2015
Aspergillus protuberus Munt.-Cvetk	SW	Pathotroph/Animal pathogen	X		Garzoli et al. 2015
Penicillium citrinum Thom	DW	nd	X		Garzoli et al. 2015
Penicillium expansum Link	SW	Pathotroph/Plant pathogen	X		Garzoli et al. 2015
Penicillium miczynskii K.W. Zaleski	SW	nd	X		Garzoli 2013
Penicillium sumatraense Szilvinyi	DW	nd	X		Garzoli 2013
Chaetothyriales					
Herpotrichiellaceae					

Capronia kleinmondensis Marincowitz, M.J. Wingf. & Crous	SW	nd	X		Garzoli et al. 2015
Exophiala angulospora Iwatsu, Udagawa & T. Takase	DW	nd	X		Garzoli et al. 2015
LEOTIOMYCETES					
Helotiales					
Dematiaceae					
Asteromyces cruciatus Moreau & V. Moreau ex Hennebert	DW, TB	nd	X		Cuomo et al. 1988
Ploettnerulaceae					
Cadophora luteo-olivacea (J.F.H. Beyma) T.C. Harr. & McNew	SW	nd	X		Garzoli et al. 2015
Tricladiaceae					
Halenospora varia (Anastasiou)	SWT	nd	X		Hassett et al. 2020
SORDARIOMYCETES					
Chaetosphaeriales					
Chaetosphaeriaceae					
Marinokulati chaetosa (Kohlm.) E.B.G. Jones & K.L. Pang	DW; TB	nd	X		Cuomo et al. 1988
Glomerellales					
Plectosphaerellaceae					

Gibellulopsis nigrescens (Pethybr.) Zare, W. Gams & Summerb.	SW	nd	X		Garzoli et al. 2015
Verticillium sp.	DW	Pathotroph-Symbiotroph/Endophyte-Fungal Parasite-Plant Pathogen	X		Garzoli 2013
Hypocreales					
Hypocreales i.s.					
Acremonium sp.	DW, SW	Pathotroph-Saprotroph-Symbiotroph/Animal Pathogen-Endophyte-Fungal Parasite-Plant Pathogen-Wood Saprotroph	X		Garzoli et al. 2015
Acremonium implicatum (J.C. Gilman & E.V. Abbott) Gams	DW	Pathotroph/Animal Pathogen	X		Garzoli et al. 2015
Acremonium tubakii W. Gams	SW	Pathotroph/Animal pathogen	X		Garzoli et al. 2015
Furcasterigmium furcatum (Gams) Giraldo López & Crous	DW, SW	nd	X		Garzoli et al. 2015
Bionectriaceae					
Clonostachys rosea (J.C. Gilman & E.V. Abbott) Schr.	DW, SW	Pathotroph/Fungal parasite	X		Garzoli et al. 2015
Cordycipitaceae					
Engyodontium album (Limber) de Hoog	DW, SW	Pathotroph/Animal pathogen	X		Garzoli et al. 2015

Hypocreaceae					
Trichoderma atroviride P. Karst.	SW	nd	X		Garzoli et al. 2015
Trichoderma sp.	DW	Pathotroph-Saprotroph-Symbiotroph/Animal pathogen-Endophyte-Epiphyte-Fungal parasite-Plant pathogen-Wood saprotroph	X		Garzoli et al. 2015
Nectriaceae					
Fusarium avenaceum (Fr.) Sacc.	SW	Pathotroph/Plant pathogen	X		Garzoli et al. 2015
Fusarium fujikuroi Nirenberg	SW	Pathotroph/Plant pathogen	X		Garzoli et al. 2015
Fusarium oxysporum Schltdl.	DW	nd	X		Garzoli et al. 2015
Gibberella stilboides W.L. Gordon ex C. Booth,	DW	Pathotroph/Plant pathogen	X		Garzoli et al. 2015
Ilyonectria destructans (Zinssm.) Rossman, L. Lombard & Crous	SW	nd	x		Garzoli et al. 2015
Neocosmospora haematococca (Berk. & Broome) Samuels, Nalim & Geiser	SW, DW	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Garzoli et al. 2015
Niessliaceae					
Niesslia exilis (Alb. & Schwein.) G. Winter	DW	nd	X		Garzoli et al. 2015

Ophiocordycipitaceae					
Purpureocillium lilacinum (Thom) Luangsa-ard, Houbraken, Hywel-Jones & Samson	DW	nd	X		Garzoli et al. 2015
Lulworthiales					
Lulworthiaceae					
Halazoon melhae Abdel-Aziz, Abdel-Wahab & Nagah	DW	nd	x		Abdel-Wahab et al. 2010
Lulwoana uniseptata (Nakagiri) Kohlm., Volkm.-Kohlm., J. Campb., Spatafora & Gräfenhan	DW, TB; SWT	nd	X		Cuomo et al. 1988; Hassett et al. 2020
Lulworthia floridana Meyers	SWT	nd	X		Hassett et al. 2020
Lulworthia purpurea (I.M. Wilson) T.W. Johnson	TB	Saprotroph/Wood saprotroph	X		Cuomo et al. 1988
Moleospora maritima Abdel-Wahab, Abdel-Aziz & Nagah	DW	nd	X		Abdel-Wahab et al. 2010
Ophiobolus kniepii-like	DW, TB	nd	X		Cuomo et al. 1988
Paralulworthia halima (Anastasiou) M. Gonçalves, A. Abreu & A. Alves	DW	nd	X		Cuomo et al. 1988, Poli et al. 2021b
Microascales					
Halosphaeriaceae					
Arenariomyces cinctus Höhnk	DW, TB	nd	X		Cuomo et al. 1988
Ceriosporopsis circumvestita (Kohlm.) Kohlm.	DW, TB	nd	X		Cuomo et al. 1988

Ceriosporopsis halima Linder	DW	nd	X		Cuomo et al. 1988; Garzoli et al. 2015
Cirrenalia macrocephala (Kohlm.) Meyers & R.T. Moore	DW; SWT	nd	X		Cuomo et al. 1988; Hassett et al. 2020
Corollospora maritima Werderm.	DW;SWT	Symbiotroph/endophyte	X		Garzoli et al. 2015; Hassett et al. 2020
Corollospora portsaidica Abdel-Wahab & Nagah.	DW*	nd	X		Abdel-Wahab et al. 2009
Haligena elaterophora Kohlm.	DW; TB	nd	X		Cuomo et al. 1988
Halosphaeria appendiculata Linder	DW; SWT	nd	X		Cuomo et al. 1988; Hassett et al. 2020
Halosphaeria mediosetigera Cribb & J.W. Cribb	SWT	nd	X		Hassett et al. 2020
Halosphaeria quadri-remis (Höhnk) Kohlm.	DW; SWT	nd	X		Cuomo et al. 1988; Hassett et al. 2020
Lignincola laevis Höhnk	DW; TB	nd	X		Cuomo et al. 1988
Nais inornata Kohlm.	DW; TB	Saprotroph/ Wood Saprotroph	X		Cuomo et al. 1988;
Nautosphaeria cristaminuta E.B.G. Jones	DW	nd	X		Cuomo et al. 1988;
Nereiospora comata (Kohlm.) E.B.G. Jones, R.G. Johnson & S.T. Moss	SWT	nd	X		Hassett et al. 2020
Nereiospora cristata (Kohlm.) E.B.G. Jones, R.G. Johnson & S.T. Moss	DW; TB; SWT	nd	X		Cuomo et al. 1988; Hassett et al. 2020
Remispora hamata (Höhnk) Kohlm.	DW; TB	nd	X		Cuomo et al. 1988

Remispora maritima Linder	DW; TB	nd	X		Cuomo et al. 1988
Remispora trullifera Kohlm.	DW; TB	nd	X		Cuomo et al. 1988
Toriella tubulifera (Kohlm.) Sakay., K.L. Pang & E.B.G. Jones	DW	nd	X		Cuomo et al. 1988
Microascaceae					
Pseudallescheria boydii (Shear) McGinnis, A.A. Padhye & Ajello	DW	Pathotroph/Animal pathogen	X		Garzoli et al. 2015
Pseudoscopulariopsis hibernica (A. Mangan) Sand.-Den., Gené & Cano	DW	nd	X		Garzoli et al. 2015
Sordariales					
Chaetomiaceae					
Botryotrichum piluliferum Sacc. & Marcha	DW	Saprotroph/Wood Saprotroph	X		Garzoli et al. 2015
Culcitalna achraspora Meyers & R.T. Moore	DW, TB	nd	X		Cuomo et al. 1988
Humicola alopallonella Meyers & R.T. Moore	DW	nd	X		Cuomo et al. 1988
Torpedosporales					
Juncigenaceae					
Cumulospora marina I. Schmidt	DW	Saprobic as the author states	X		Abdel-Wahab et al. 2010
Juncigena fruticosae (Abdel-Wahab, Abdel-Aziz & Nagah.) A.N. Mill. & Shearer	DW	Saprobic as the author states	X		Abdel-Wahab et al. 2010

Moromyces varius (Chatmala & Somrith.) Abdel-Wahab, K.L. Pang, Nagah., Abdel-Aziz & E.B.G. Jones,	DW	Saprobic as the author states	X		Abdel-Wahab et al. 2010
Torpedosporaceae					
Torpedospora radiata Meyers	DW; TB	nd	X		Cuomo et al. 1988
BASIDIOMYCOTA					
AGARICOMYCETS					
Agaricales					
Niaceae					
Nia vibrissa R.T. Moore & Meyers	DW, TB	nd	X		Cuomo et al. 1988
MUCOROMYCOTA					
MUCOROMYCETES					
Mucorales					
Mucoraceae					
Rhizopus stolonifer (Ehrenb.) Vuill	DW	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Garzoli et al. 2015

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