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Seagrasses, seaweeds and plant debris: an extraordinary reservoir of fungal diversity in the Mediterranean Sea

This is a pre print version of the following article:

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/1872744> since 2022-08-26T09:50:27Z

Published version:

DOI:10.1016/j.funeco.2022.101156

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1 Seagrasses, seaweeds and plant debris: an extraordinary reservoir of fungal diversity in the
2 Mediterranean Sea

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9 Running Head: Fungal diversity in the Mediterranean Sea

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26 **Abstract**

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

30 For each of the three substrates, the taxa belong mainly to the phylum Ascomycota, which
31 on average accounts for 92.7%. Basidiomycota are better represented in seagrasses (9.8%)
32 than in seaweeds (4.9%) and woods (1.2%). Mucoromycota and Mortirellomycota are
33 scarce, while Chytridiomycota are detected only in association with phanerogames (3.7%).
34 Dothideomycetes and Sordariomycetes are the dominant classes, while the orders
35 Pleosporales and Hypocreales are significantly represented in the three substrates (42,
36 37, 10 taxa-30, 40, 16 taxa).

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

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

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

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51 **1. Introduction**

52 In the last decades, intensive surveys have been performed worldwide with the
53 intent of broadening our understanding on the fungal biodiversity hosted in marine
54 environments (Abdel-Aziz 2010; Abdel-Wahab *et al.* 2014; Alias *et al.* 2010; Calado *et al.*
55 2021; Ettinger & Eisen 2019; Ettinger *et al.* 2021; Garzoli *et al.* 2018; Gnavi *et al.* 2017;
56 Grasso *et al.* 1985; Hassett *et al.* 2019; Jones & Abdel-Wahab 2005; Jones & Pang 2012a;
57 Loque *et al.* 2010; Poli *et al.* 2020a; Rama *et al.* 2014; Steinke & Jones 1993; Zuccaro &
58 Mitchell 2005). Generally, the occurrence of fungi has been documented on a variety of
59 substrates such as seagrasses, seaweeds, invertebrates, driftwoods, sediments, seafoam etc.
60 (Abdel-Wahab *et al.* 2019; Bovio *et al.* 2019; Bovio *et al.* 2018; Jones & Pang 2012b; Poli
61 *et al.* 2020a; Raghukumar 2017; Rama *et al.* 2014; Zuccaro & Mitchell 2005). While some
62 species are cosmopolitan in their distribution, others are restricted to tropical, cold or
63 temperate waters (Jones & Pang 2012a; Tibell *et al.* 2020); likewise, each substratum
64 seems to recruit a specific mycobiota, although some species are generalists (Poli *et al.*
65 2020a). A huge amount of information is available on tropical marine fungi from mangrove
66 ecosystems (Abdel-Wahab 2005; Abdel-Wahab *et al.* 2019; Alias *et al.* 1995; Alias *et al.*
67 2010; Devadatha *et al.* 2021; Hyde & Jones 1988; Manimohan *et al.* 2011; Norphanphoun
68 *et al.* 2018; Poonyth *et al.* 1999; Schmit & Shearer 2003; Steinke & Jones 1993; Suetrong
69 *et al.* 2017). However, knowledge on the distribution and association to substrates in
70 temperate regions is still scant. In this review, we intend to gather all the available
71 information on marine fungi associated with aquatic plants, algae and woods in the
72 Mediterranean Sea.

73 **2. The Mediterranean Area**

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

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

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

90 3. The Seagrass Ecosystem

91 Seagrasses are widely distributed flowering plants that grow and reproduce underwater in
92 shallow coastal environments. Seagrass meadows play central roles in the ecosystems
93 supporting high biodiversity and productivity, stabilizing sediments, contributing to
94 oxygen production and CO₂ consumption, purifying waters and providing nourishment and
95 shelters for marine creatures (Perez-Llorens *et al.* 2014; Raghukumar 2017). Of the 72
96 species of seagrasses, affiliated to 12 genera, spread worldwide, only 4 are found in the
97 Mediterranean Sea: the endemic *Posidonia oceanica*, *Zostera marina* mostly found as
98 small isolated stands, *Zostera noltii* that forms dense beds in the muddy sand of intertidal
99 areas, and *Cymodocea nodosa* (Borum & Greve 2004; de los Santos *et al.* 2019; Perez-
100 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 leaves 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 Directive 92/43/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; Gnani *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; Gnani *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

126 3.1 Taxonomic classification of fungi associated with seagrasses

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

130 3.1.1 Ascomycota

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

134 As for the orders, Pleosporales, Eurotiales and Hypocreales are recurring with 42, 34 and
135 30 reported taxa, respectively (Figure 4). Following, with less than half taxa, are
136 Cladosporiales (15) and Hypocreales (11) (Figure 4).

137 Within Eurotiales, the family Aspergillaceae accounts for more than 94% (Figure 5), 20%
138 of Hypocreales are *incertae sedis*, while Hypocreaceae and Nectriaceae account each for
139 17%, followed by Stachybotriaceae (13.3%). With the exception of Pleosporaceae (19%)
140 and Dydimosphaeriaceae (14.3%), 17 families of Pleosporales are almost equally
141 represented (Figure 5).

142 *Penicillium* is by far dominant in the family Aspergillaceae (70%), followed by *Aspergillus*
143 (23.5%). *Acremonium* (20%) and *Trichoderma* (31.3%) are the most often recorded genera
144 of Hypocreales. On the contrary, no prevalent genera are observed among Pleosporales.

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

148 3.1.2 Basidiomycota

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

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

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

155 3.1.3 Chytridiomycota and Mucoromycota

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

160 3.2 Hosts and hypothetical ecological roles

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

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

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

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

191 4. The Macroalgal Ecosystem

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

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

204 A huge algal biodiversity finds home in the *P. oceanica* meadows: suffice it to know that
205 only the epiphytes count more than 300 species of seaweeds (Piazzi *et al.* 2016). Generally,
206 algae are known to produce bioactive compounds (Pinteus *et al.* 2015; Pinteus *et al.* 2018;
207 Rodrigues *et al.* 2015), although a number of studies indicates that algicolous fungi are the
208 true responsible for the synthesis of these molecules (Flewelling *et al.* 2015; Overy *et al.*
209 2014).

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

212 4.1 Taxonomic classification of fungi associated with seaweeds

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

219 4.1.1 Ascomycota

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

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

226 The family Aspergillaceae accounts for more than 93% within the Eurotiales (Figure 8);
227 most of Hypocreales are *incertae sedis* (27.5%), Hypocreaceae represent the 15% of the
228 order, while Bionetriaceae and Nectriaceae are equally present (12.5% each). Among the
229 14 families of Pleosporales observed, Pleosporaceae greatly contribute with 32.4%
230 followed by Rousoellaceae and Thyridariaceae (10.8% each) (Figure 8).

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

234 4.1.2 Basidiomycota and Mortierellomycota

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

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

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

243 4.2 Hosts and hypothetical ecological roles

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

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

255 5. Drift- and submerged wood

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

261 5.1 Taxonomic classification of wood – colonizing fungi

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

267 5.1.1 Ascomycota

268 Also in drift- and submerged woods, Sordariomycetes are the best represented class (68.7%
269 - 56 taxa). Dothideomycetes contribute with 15 taxa (18.7%), while Eurotiomycetes and
270 Leotiomycetes are a minority (9.6% - 8 taxa, 3.6% - 3 taxa) (Figure 3).
271 Microascales, Hypocreales, and Pleosporales are the most abundant orders with 21, 16 and
272 10 taxa respectively, followed by Lulworthiales with 9 taxa (Figure 10).

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

276 *Halosphaeria* and *Remispora* are the most abundant genera in the family Halosphaeriaceae
277 (14.3% each) followed by *Ceriosporopsis*, *Corollospora* and *Nereiospora* (9.5% each).
278 *Acremonium*, *Fusarium* and *Trichoderma* (18.75%, 18.75% and 12.5%) are the genera of
279 Hypocreales more often retrieved, while *Alternaria* is the most detected genus of
280 Pleosporales (20%).

281 5.1.2 Basidiomycota and Mucoromycota

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

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

287 5.2 Hosts and hypothetical ecological roles

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

292 The retrieval of only one member of Basidiomycota (*Nia vibrissae*) may contradict the
293 well-known ability of these fungi to degrade lignocellulose material in terrestrial
294 environments. However, notwithstanding the high incidence of fungi observed on woody
295 substrates in marine environments worldwide, there is limited evidence that assess their
296 degradation ability (Hyde *et al.* 1998; Pointing & Hyde 2000). Nevertheless, Ascomycota
297 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 ligninolytic 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 and 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 thoroughly 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 almost 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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348

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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						
<i>Creasteria cymatilis</i> Meyers & R.T. Moore	PO	Leaves	nd	X		Panno et al. 2013
<i>Myxotrichum deflexum</i> Berk.	PO	Leaves	nd	X		Garzoli 2013
<i>Radulidium epichloës</i> (Ellis & Dearn.) Arzanlou, W. Gams & Crous	PO	Matte	nd	X		Panno et al. 2013
<i>Stachylidium bicolor</i> Link	PO	Rhizomes/Matte		X		Panno et al. 2013
DOTHIDEOMYCETES						
<i>Cyclothyrium</i> sp.	PO	Matte	nd	X		Panno et al. 2013
<u>Botryosphaeriales</u>						
<u>Botryosphaeriaceae</u>						
<i>Botryosphaeria dothidea</i> (Moug.) Ces. & De Not	PO	ND	Pathotroph/Plant pathogen	X		Pasqualetti et al. 2020
<u>Capnodiales</u>						
<u>Capnodiaceae</u>						
<i>Capnodium</i> sp.	PO	Rhizomes	Saprotroph/Undefined saprotroph	X		Panno et al. 2013 Poli et al. 2020a

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

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

<u>Dothioraceae</u>						
<i>Aureobasidium pullulans</i> (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
<i>Nothophaeocryptopus gaeumannii</i> (T. Rohde) Videira, C. Nakash., U. Braun & Crous	PO	Leaves	nd	X		Panno et al. 2013
<u>Mycosphaerellales</u>						
<u>Mycosphaerellaceae</u>						
<i>Pseudocercospora fraxini</i> (Ellis & Kellerm.) U. Braun	PO	Leaves	nd	X		Panno et al. 2013
<i>Ramularia endophylla</i> Verkley & U. Braun	PO	Leaves	Pathotroph/Plant pathogen	X		Panno et al. 2013
<u>Pleosporales</u>						
<i>Phoma</i> sp.	PO, CN	Matte	nd	X		Cuomo et al. 1985; Cuomo et al. 1988; Panno et al. 2013
<u>Aigialaceae</u>						
<i>Posidoniomyces atricolor</i> Vohník & Réblová	PO	Roots	Endophyte	X	X	Vohník et al. 2016; Vohník et al. 2019
<u>Dictyosporiaceae</u>						
<i>Paradendryphiella salina</i> (G.K. Sutherland) Woudenb. & Crous	Z, CN	nd	nd	X		Cuomo et al. 1988

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Mucorales

Cunninghamellaceae

<i>Cunninghamella bertholletiae</i> 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						
<i>Devriesia</i> sp.	FP	Green	Pathotroph/Animal pathogen	X		Gnavi et al. 2017
<i>Knufia karalitana</i> Isola & Onofri	SM	Brown	nd	X		Garzoli 2013
<i>Knufia petricola</i> (U. Wollenzien & de Hoog) Gorbushina & Gueidan	FP, SM	Green, Brown	nd	X		Garzoli 2013; Gnavi et al. 2017
<i>Neodevriesia lagerstroemiae</i> (Crous & M.J. Wingf.) Crous	PP	Brown	nd	X		Garzoli et al. 2018
<i>Sirococcus conorum</i> Sacc. & Roum	FV	Brown	nd	X		Garzoli 2013
DOTHIDEOMYCETES						
<u>Botryosphaeriales</u>						
<u>Botryosphaeriaceae</u>						

<i>Diplodia</i> sp.	DM	Brown	Pathotroph-Saprotroph- Symbiotroph/Epiphyte-Plant Pathogen-Wood Saprotroph	X		Cuomo et al. 1988
<u>Capnodiales</u>						
<u>Dissoconiaceae</u>						
<i>Zasmidium strelitziae</i> (Arzanlou, W. Gams & Crous) Videira & Crous	PP	Brown	nd	X		Garzoli et al. 2018
<u>Cladosporiales</u>						
<u>Cladosporiaceae</u>						
<i>Cladosporium</i> sp.	PP, CR, UR, C, P, DD, HT, SS	Brown, Green, Red	nd	X		Garzoli 2013; Garzoli et al. 2018
<i>Cladosporium allicinum</i> (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
<i>Cladosporium cladosporioides</i> (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
<i>Cladosporium delicatulum</i> Cooke, Grevillea	PP	Brown	nd	X		Garzoli et al. 2018
<i>Cladosporium halotolerans</i> Zalar, de Hoog & Gunde-Cim.	PP, CR	Brown, Green	Pathotroph/Animal pathogen	X		Garzoli 2013; Garzoli et al. 2018
<i>Cladosporium herbarum</i> (Pers.) Link	FP	Green	Pathotroph-Saprotroph/ Plant Pathogen-Wood Saprotroph	X		Gnavi et al. 2017

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

Dothidelaes

Dothideales i.s.

<i>Biatriospora</i> sp.	FP	Green	nd	X		Gnavi et al. 2017
<u>Dothioraceae</u>						
<i>Aureobasidium pullulans</i> (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
<i>Sydowia polyspora</i> (Bref. & Tavel) E. Müll	UR, SM	Brown, Green	Pathotroph/Plant pathogen	X		Garzoli 2013
<u>Mycosphaerellales</u>						
<u>Mycosphaerellaceae</u>						
<i>Ramularia eucalypti</i> Crous	FP	Green	nd	X		Gnavi et al. 2017
<u>Pleosporales</u>						
<i>Aaosphaeria arxii</i> (Aa) Aptroot	PP	Brown	nd	X		Garzoli et al. 2018
<i>Ochrocladosporium frigidarii</i> Crous & U. Braun	PP	Brown	nd	X		Garzoli et al. 2018
<i>Phoma</i> sp.	EC, TA, UC	Brown, Green	nd	X		Cuomo et al. 1988
<u>Arthopyreniaceae</u>						
<i>Arthopyrenia salicis</i> A. Massal.	FP	Green	nd	X		Gnavi et al. 2017
<u>Cucurbitariaceae</u>						
<i>Pyrenochaeta rubi-idaei</i> Cavara	DM	Brown	nd	X		Cuomo et al. 1988

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

<i>Microsphaeropsis olivacea</i> (Bonord.) Höhn	PP	Brown	Pathotroph-Symbiotroph/Pathotroph-Symbiotroph	X		Garzoli et al. 2018
Phaeosphaeriaceae						
<i>Phaeosphaeria</i> sp.	PP, P	Brown, Red		X		Garzoli 2013; Garzoli et al. 2018
Pleosporaceae						
<i>Alternaria</i> 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
<i>Alternaria abundans</i> (E.G. Simmons) Woudenb. & Crous	CR	Green	nd	X		Garzoli 2013
<i>Alternaria alternata</i> (Fr.) Keissl.	FP, DD	Brown, Green	nd	X		Gnavi et al. 2017; Pasqualetti et al. 2020
<i>Alternaria chlamydospora</i> Mouch.	FV, DD	Brown, Green	nd	X		Garzoli 2013; Pasqualetti et al. 2020
<i>Alternaria consortialis</i> (Thüm.) J.W. Groves & S. Hughes	DD	Brown	nd	X		Garzoli 2013
<i>Alternaria maritima</i> -like	DM, CV, UN, UC	Brown, Green	nd	X		Cuomo et al. 1988

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

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

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

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

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

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

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

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

<i>Metarhizium granulomatis</i> (Sigler) Kepler, S.A. Rehner & Humbe	PP	Brown	nd	X		Garzoli et al. 2018
<i>Pochonia chlamydosporia</i> (Goddard) Zare & W. Gams	PP	Brown	nd	X		Garzoli et al. 2018
<u>Cordycipitaceae</u>						
<i>Amphichorda felina</i> (DC.) Fr	CR	Green	nd	X		Garzoli 2013
<i>Beauveria bassiana</i> (Bals.-Criv.) Vuill.	FP, P	Green, Red	Pathotroph/Animal pathogen	X		Garzoli 2013; Gnavi et al. 2017
<i>Simplicillium lamellicola</i> (F.E.V. Sm.) Zare & W. Gams	FV, SS	Brown	nd	X		Garzoli 2013
<u>Hypocreaceae</u>						
<i>Acrostalagmus luteoalbus</i> (Link) Zare, W. Gams & Schroers	FP, PP	Brown, Green	Symbiotroph Endophyte	X		Gnavi et al. 2017; Garzoli et al. 2018
<i>Trichoderma aureoviride</i> Rifai	PP	Brown	Symbiotroph/Endophyte	X		Garzoli et al. 2018
<i>Trichoderma harzianum</i> Rifai	PP	Brown	Pathotroph/ Endophyte-Fungal Parasite-Plant Pathogen	X		Garzoli et al. 2018
<i>Trichoderma koningii</i> Oudem	PP	Brown	Pathotroph- Symbiotroph/Endophyte-Plant pathogen	X		Garzoli et al. 2018
<i>Trichoderma lixii</i> (Pat.) P. Chaverri	DD	Brown	nd	X		Pasqualetti et al. 2020
<i>Trichoderma</i> 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			
<u>Nectriaceae</u>						
<i>Fusarium</i> sp.	P, HT	Brown, Red	nd	X		Garzoli 2013
<i>Fusarium incarnatum-equiseti</i> species complex	FV	Green	nd	X		Garzoli 2013
<i>Fusarium oxysporum</i> Schltdl.	PP	Brown	nd	X		Garzoli et al. 2018
<i>Nectria inventa</i> Pethybr.	CTO, P, CY	Brown, Green, Red	nd	X		Garzoli 2013
<i>Volutella ciliata</i> (Alb. & Schwein.) Fr.	CTO, UR	Green	nd	X		Garzoli 2013
<u>Niessliaceae</u>						
<i>Sedecimiella taiwanensis</i> K.L. Pang, Alias & E.B.G. Jones	FP	Green	nd	X		Gnavi et al. 2017
<u>Ophiocordycipitaceae</u>						
<i>Purpureocillium lilacinum</i> (Thom) Luangsa-ard, Houbraken, Hywel-Jones & Samson	UR, P, HT	Brown, Green, Red	nd	X		Garzoli 2013
<u>Stachybotryaceae</u>						
<i>Stachybotrys chartarum</i> (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

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

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

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

<i>Schizophyllum commune</i> 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
<u>Polyporales</u>						
<u>Meruliaceae</u>						
<i>Bjerkandera adusta</i> (Willd.) P. Karst.	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2018
CYSTOBASIDIOMYCETES						
ES						
<u>Buckleyzymales</u>						
<u>Buckleyzymaceae</u>						
<i>Rhodotorula aurantiaca</i> (Saito) Lodder	PP	Brown	Symbiotroph/Endophyte	X		Garzoli et al. 2018; Poli et al. 2018
MICROBOTRYOMYCETES						
ES						
<u>Sporidiobolales</u>						
<u>Sporidiobolaceae</u>						
<i>Rhodotorula graminis</i> Di Menna	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2018
WALLEMIOMYCETES						
<u>Wallemiales</u>						
<u>Wallemiaceae</u>						

<i>Wallemia sebi</i> (Fr.) Arx	PP	Brown	nd	X		Garzoli et al. 2018; Poli et al. 2018
MORTIERELLOMY COTA						
MORTIERELLOMYCET ES						
<u>Mortierellales</u>						
<u>Mortierellaceae</u>						
<i>Mortierella alpina</i> Peyronel	PP	Brown	nd			Garzoli et al. 2018

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

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

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

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

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

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

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

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

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

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

<i>Moromyces varius</i> (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
<u>Torpedosporaceae</u>					
<i>Torpedospora radiata</i> Meyers	DW; TB	nd	X		Cuomo et al. 1988
BASIDIOMYCOTA					
AGARICOMYCETS					
<u>Agaricales</u>					
<u>Niaceae</u>					
<i>Nia vibrissa</i> R.T. Moore & Meyers	DW, TB	nd	X		Cuomo et al. 1988
MUCOROMYCOTA					
MUCOROMYCETES					
<u>Mucorales</u>					
<u>Mucoraceae</u>					
<i>Rhizopus stolonifer</i> (Ehrenb.) Vuill	DW	Pathotroph-Symbiotroph/ Endophyte-Plant Pathogen	X		Garzoli et al. 2015