A. Rambelli, C. Ciccarone, S. Tempesta & G. Venturella

Dematiaceous *Hyphomycetes* from Bosco Isola (S Italy) Mediterranean maquis litter

Abstract

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This is the fifth contribution to the knowledge of Dematiaceous *Hyphomycetes* colonizing the litter in Mediterranean maquis. Twelve species are described and notes on the morphological characters are pointed out. Three of them are reported as genus, they need an examination of more material.

Key words: Bosco Isola maquis, Dematiaceous *Hyphomycetes*.

Introduction

The results of this first study of the Bosco Isola Mediterranean maquis must be considered at the beginning since the samples collection was carried out in winter during a period of very low temperatures and, mainly, examining only a very small part of the area. Other investigations will be done during the spring and summer of the next year with the aim to compare the results of the different samplings.

Material and methods

We employed the same techniques utilized in previous contributions (Rambelli & al. 2008, 2009, 2009a, 2010), mainly concerning the method used to respect the proportions of the different mycological structures: unique imagine of the different structures and drawings.

The vegetation of Bosco Isola

Bosco Isola is located near_Lesina (province of Foggia, Apulia, southern Italy) on the sandy dunes of the Adriatic coast. Two channels (Acquarotta and Schiapparo) overboard

this inlet connect the internal lagoon to the sea, outlining the look of a true island. The whole area is preserved as natural reserve. Twenty types of vegetation and ca. 700 botanical taxa, belonging to 350 genera and 80 families were listed in the area.

The main vegetation types are represented by:

- garrigue of *Erica multiflora* L., *Rosmarinus officinalis* L. and *Cistus clusii* Dunal.
- *Quercus ilex* L. woods;
- *Q. ilex*, *Phyllirea latifolia* L., *Rhamnus alaternus* L. and *Pistacia lentiscus* L. maquis;
- *Juniperus oxycedrus* L. var. *macrocarpa* (S. et S.) Ball and *J. phoenicea* L.
- low garrigue of *Fumana thymifolia* (L.) Spach. and *Helianthemum jonium* Lacaita;

Besides, typical dune vegetation with *Carex vulpina* L., *Salicornia ramosissima* J. Woods, characterizes the sandy seashore. Behind the shoreline of Lesina the sea winds are restrained by flag-shaped alignment of *Acacia cyanophylla* Lindley, *Tamarix gallica* L., *Eucalyptus camaldulensis* Dehnh., *Pinus maritima* L. and *P. halepensis* Mill.

The district of the sedimentary sandy island is known as The Tombolo and is characterized by a plant association of *Q. pubescens* Willd., *Juniperus sabina* L., *Arbutus unedo* L., and *Rosmarinus officinalis* L.

The clayey lagoon banks of Zurrone hosts a dense *Q. ilex* wood while in the Cento Passi area the wood is enriched by holly oaks and junipers, strawberry trees, rosemary.

The Zappino is a rather lightly *P. halepensis* coppice which cuts the sea breezes up to a cover of about 12 m while the brushwood remains comparatively neat. In spite of the shielding woody alignments all the areas at their back are sweeped by wind and intensely enlighten.

The ponds of Le Fantine lie among the dune area of Tombolo and the Lesina lake. The more representative species are *Cladium mariscus* (L.) Pohl, *Schoenoplectus lacustris* (L.) Pall., *Phragmites australis* (Cav.) Trin. ex Steud., *Juncus* spp. and *Typha* sp. which decorate the Lauro river's mouth.

In the channels watery areas (Sant'Andrea, Schiapparo, Acquarotta, Le Fantine, Lesina Lagoon) some interesting orchid species are present such as *Ophrys iricolor* Desf., *Ophrys sphecodes* subsp. *garganica* Nelson and *Epipactis palustris* (L.) Crantz.

The richest area is represented by the Volta di Mileto with mixed woods of oak, pine, hornbeam and elm.

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Taxonomy

Gyrothrix verticillata Pirozynski, 1962.
Type species: *G. podosperma* (Corda) Rabenhorst 1844.

Colonies gray, compact and composed by several and very crowded setae and conidiophores. Setae erect, straight, very crowded, brown, clear brown, septate, smooth, sometimes simples, more frequently 2-3 times branched, with branches disposed at right angles and opposite, sometimes with the main seta apex and branches sinuous or flexuous, 150-225×4 µm. Conidiophores micronematous, on the basal hyphae and at the base of the setae. Conidiogenous cells obclavate, hyaline, 4-9×4-5 µm. Conidia aggregated at the base of the setae and forming a white layer, they are cylindricals or gently curved, with rounded or gently corniform apex and pointed base, hyaline, 0-septate, 10-14×1.8 µm.
On dead leaves of *Pistacia lentiscus* L. and *Phillyrea latifolia* L

The species described presents little differences if compared to the original description of the species (Pirozynski 1962): the apex of the main seta can be twisted. We have found the species on dead leaves of *Pistacia lentiscus* L. and *Phillyrea latifolia* L., in this last substratum the setae are more branched and with apices frequently gently twisted.

Gyrothrix podosperma (Corda) Rabenhorst, 1844.
Type species: *G. podosperma* (Corda) Rabenhorst, 1844.

Colonies compact, composed by several and very crowded setae and conidiophores. Setae branched, brown, dark brown, clearer and verruculoses towards the apices, septate, 160-190×5 µm, branches up to 63×3 µm. Conidiophores micronematous, originating from the superficial hyphae on the natural substratum. Conidiogenous cells polyblastic, discrete, solitary, percurrent, phyalidiform, hyaline, 5-7×1.8-2 µm. Conidia rod shaped, slightly falcate and corniform, simple, acerose, 0-septate, hyaline, smooth, forming a compact layer near the base of the setae, 15-18×1.8 µm.
On dead leaves of *Pinus domestica*

This species is characterized by a great morphological variability on the different substrata. On dead leaves of *Eucalyptus* sp. collected at Ustica island the species presents setae and branches very sinuous and with apices just a little verruculose.

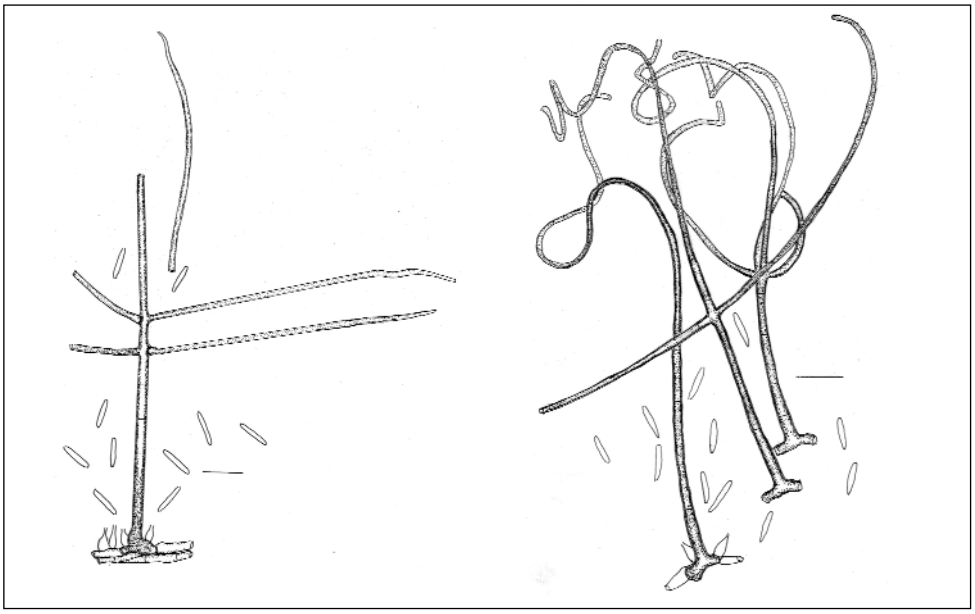

Fig. 1. Two strains of *Gyrothrix verticillata* on dead leaves of *Phillyrea latifolia*. Bars 20 µm.

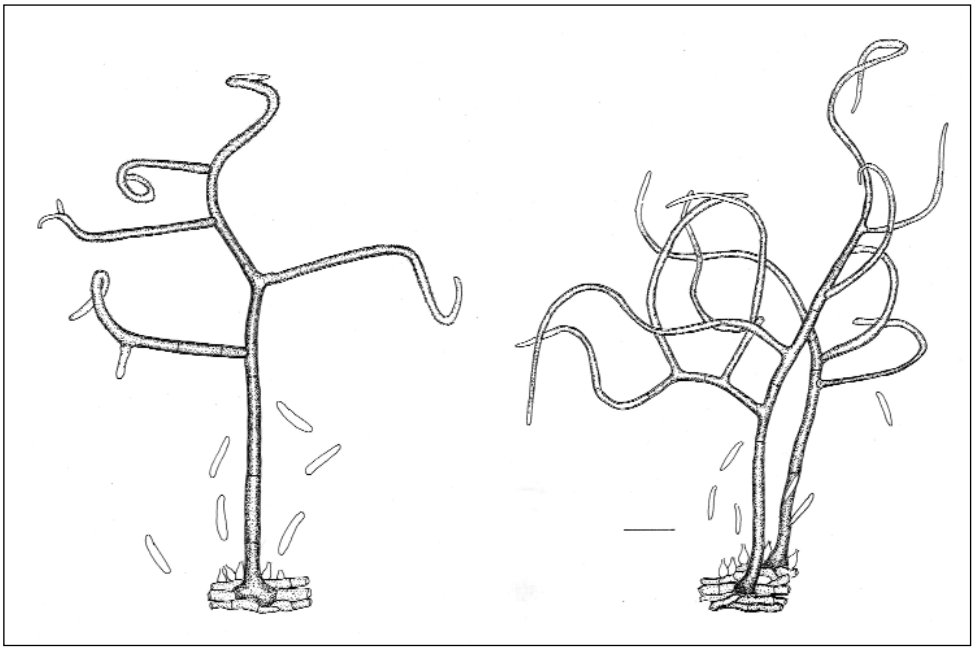

Fig. 2. *Gyrothrix podosperma*; left side from dead leaves of *Pinus domestica*, compared to the same species on *Eucalyptus* dead leaves collected at Ustica island. Bar 20 µm.

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Helicoon fuscosporum Linder, 1929.
Type species: *Helicoon sessile* Morgan, 1892.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, unbranched, straight, clear brown, smooth. Conidiogenous cells monoblastic, integrated, terminal, determinate. Conidia solitary, acrogenous, simple, coiled in 3 planes to form an ellipsoidal or cylindrical body, dark brown and composed by a smooth filament multiseptate with 11-15 coils 4-5 μm wide, 43-47×28-32 μm.
On dead small branches of *Phillyrea latifolia* L.

This species has been found also on small dead branches of *Pistacia lentiscu*s L., were the fungus is present with solitary conidiophores and slightly reduced dimensions of the conidia (34-43×16-27 μm), composed by 16-17 coils, hyphae 3 μm wide and short conidiophores (13×3 μm).

The species described presents morphological characters well coinciding with the original description (Linder, 1929) even if from the bibliographic references, appears difficult to find dimensional characters coinciding each other. We think important to point out that in our strain, studied on natural substratum and not in pure culture, the conidiophores appear not branched and with conidiogenous cells monoblastic and determinate.

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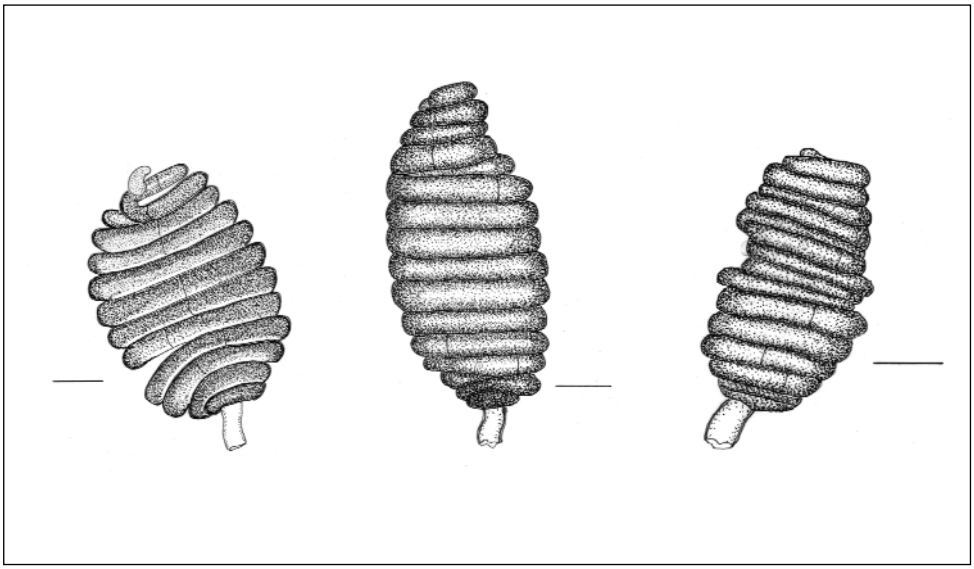

Fig. 3. *Helicoon fuscosporum*; left from dead leaves of *Phillyrea latifolia* (Bar 20 μm), center and right on dead leaves of *Pistacia lentiscus* (Bars 15 μm.).

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Veronaea sp.

Type species: *Veronaea botryosa* Cif.& Montemart., 1957.

Colonies composed by several and very crowded conidiophores, clear brown, powdery. Conidiophores macronematous, mononematous, erect or gently flexuous, clear brown, unbranched but originating from a repeatedly branched superficial mycelium, 74-140×3 μm. Conidiogenous cells acropleurogenous, sympodial, polyblastic, with lightly prominent, trunked and cicatrized conidial loci, terminal and frequently intercalary (5-14×4 μm), clear brown, 13-25×4 μm. Conidia solitary, oval, fusiform, smooth, pointed at the base and rounded at the apex, regularly 1-septate, clear brown, 11-15×4 μm.

On dead leaves of *Pistacia lentiscus* L., *Quercus ilex* L. and *Pinus pinea* L.

After a first microscopic examination we included our specimens into *Ramichloridium*, but the genus is characterized by conidiogenous cells not intercalary, or only very rarely intercalary, and, more important, conidia 0-septate. We excluded *Rhinocladiella* because with 0-septate conidia and *Dactylaria* with conidiogenous loci clearly denticulate. Our strain presents conidiogenous cells developing sympodially, with little prominent scars (0.8-1.0 μm), flat topped, cicatrized, terminal and intercalary; the conidia are regularly 1-

septate with a pointed base and rounded apex, all morphological characters of the genus *Veronaea*. Nevertheless at present we leave this species indeterminate hoping to have the opportunity to study further exsiccate.

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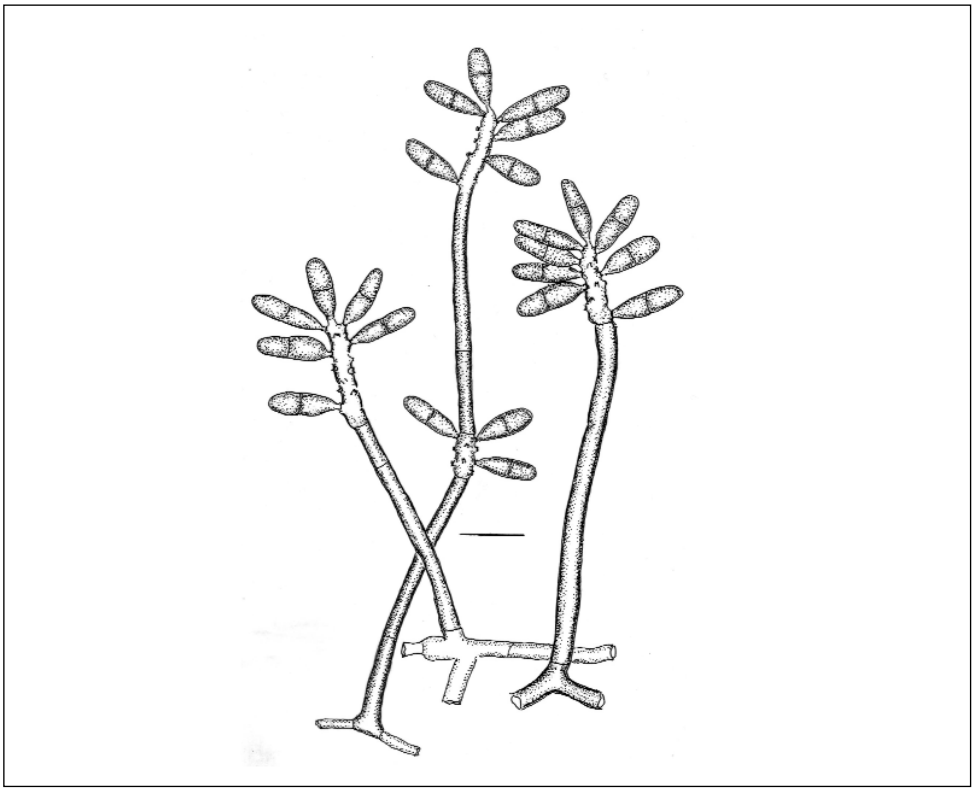

Fig. 4. *Veronaea* sp. Conidiophores and conidia. Bar 12 µm.

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Hansfordia pulvinata (Berk. et Curt.) Hughes, 1958.
Type species: *Hansfordia ovalispora* Hughes, 1951.

Colonies hairy, composed by solitary conidiophores. Conidiophores macronematous, mononematous, repeatedly branched, straight, pale brown in the lower echinulated part and paler in the upper smooth part, very variable in lenght. Conidiogenous cells as branches of the conidiophores, subhyaline, echinulate, sympodial, polyblastic, terminal, cylindrical, denticulated with denticles as separating cells, 25-34×4-5 µm. Conidia spherical, very clear brown, echinulated, 8-9×7-9 µm.
On dead leaves of indeterminate plant.

This species has been found also on dead leaves of *Arbutus unedo* L. collected at the Circeo National Park (Rambelli & al. 2009).

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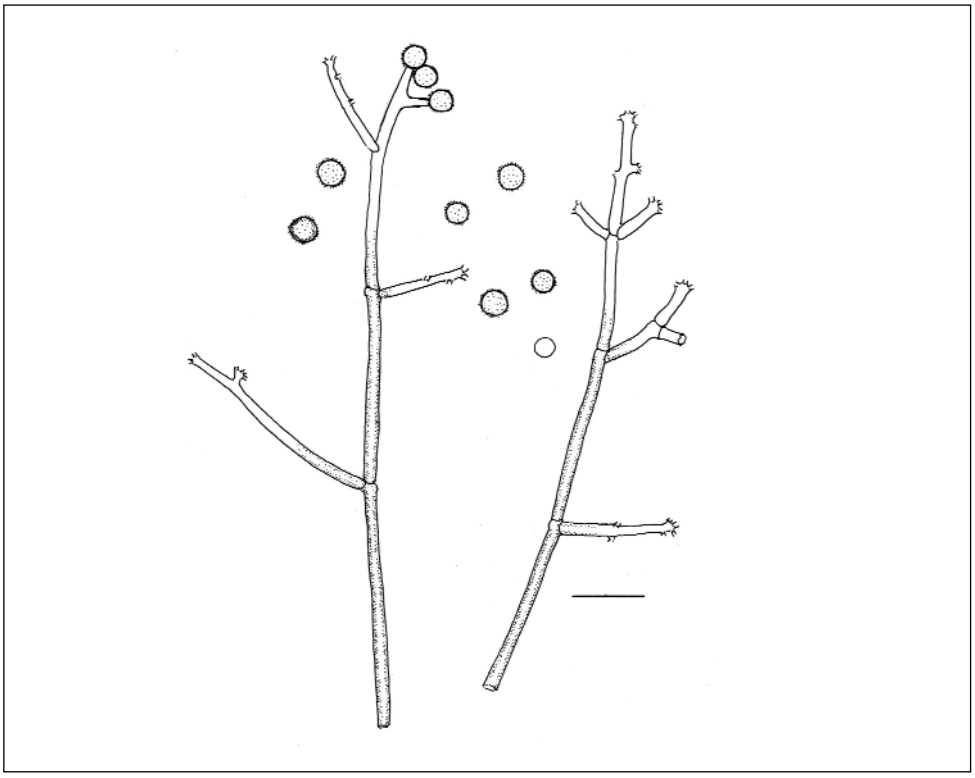

Fig. 5. *Hansfordia pulvinata*, conidiophores and conidia. Bar 24 µm.

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Zygosporium echinosporum Bunting & Mason, 1941.
Type species: *Zygosporium oscheoides* Montagne, 1842.

Colonies effuse, composed by several but not crowded and regularly distributed conidiophores, brown, clear brown. Conidiophores macronematous, mononematous, unbranched, brown, smooth, 21.7×2-3 µm, supporting a swollen solitary, dark brown, curved vesicle, 9-15×7-10 µm. Conidiogenous cells monoblastic, determinate, phialidiform, hyaline, 2 or 3 at the apex of the vesicles, 4.3-10.8×3.6-8 µm. Conidia solitary, acrogenous, 0-septate, spherical, hyaline, verruculose, 6.5×8.5 µm. Setae originating from the superficial fertile

hyphae, but not as part of the conidiophores, erect or gently flexuous, 56.3-73.6×2.3 µm, with a small hyaline apical vesicle, 4.3×8.6 µm.
On dead leaves of indeterminate plant.

Whitton & al. (2003), according to Hughes (1951) described a strain of *Z. echinosporum* with setiform conidiophores and conidiophores not as branches of the setae. Our strain is characterized by the presence of setae, and conidiophores never as branches of setae, but originating from the basal fertile hyphae on which regularly growth.

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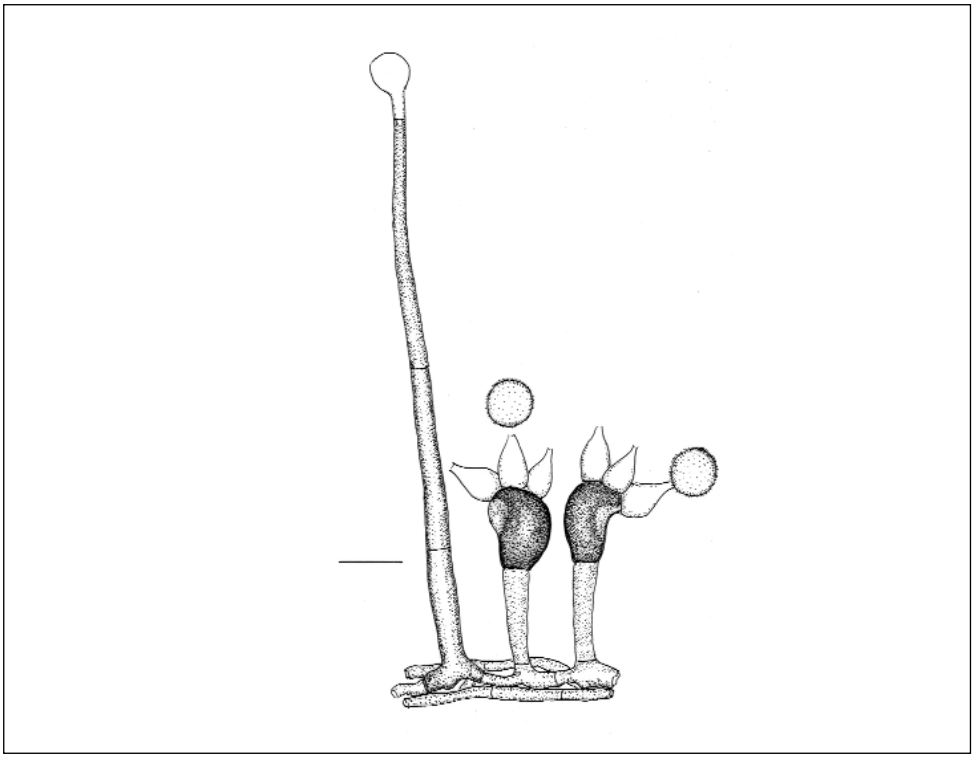

Fig. 6. *Zygosporium echinosporum*, strain with setae. Bar 10 µm.

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Bipolaris sp.

Type species: *B. maydis* (Y.Nisik. & Miyake C.) Shoemaker, 1959.

Colonies composed by isolated conidiophores. Conidiophores macronematous, mononematous, solitary, brown, erect or gently flexuous, unbranched, smooth, up to 80 µm long and 7 µm wide near the base. Conidiogenous cells integrated, polytretic, terminal, sympodial, cicatrized, clear brown. Conidia gently curved, ellipsoidal, without a protuberant hilum, brown, 5-6 distoseptate, 40-50×13-16 µm.

On dead leaves of *Arundo donax.*

The species described presents morphological characters very closed to *Bipolaris sacchari* (E.J. Butler) Shoemaker (1959) but with conidiophores and conidia more brown pigmented. A strain of *B. sacchari* was found on dead leaves of *Smilax aspera* at Montagna grande in the Pantelleria island (Rambelli & al. 2009) and a strain very similar on indeterminated dead leaves collected in the same locality, but with yellow-brown conidiophores and conidia. These strains for the poor material examined were left indeterminate. We are obliged to do the same for the strain collected at Bosco Isola, hoping in other findings.

Material examined

Isotype ROHB 493, on dead leaves of Orchid 2819 D.B. Costa Rica

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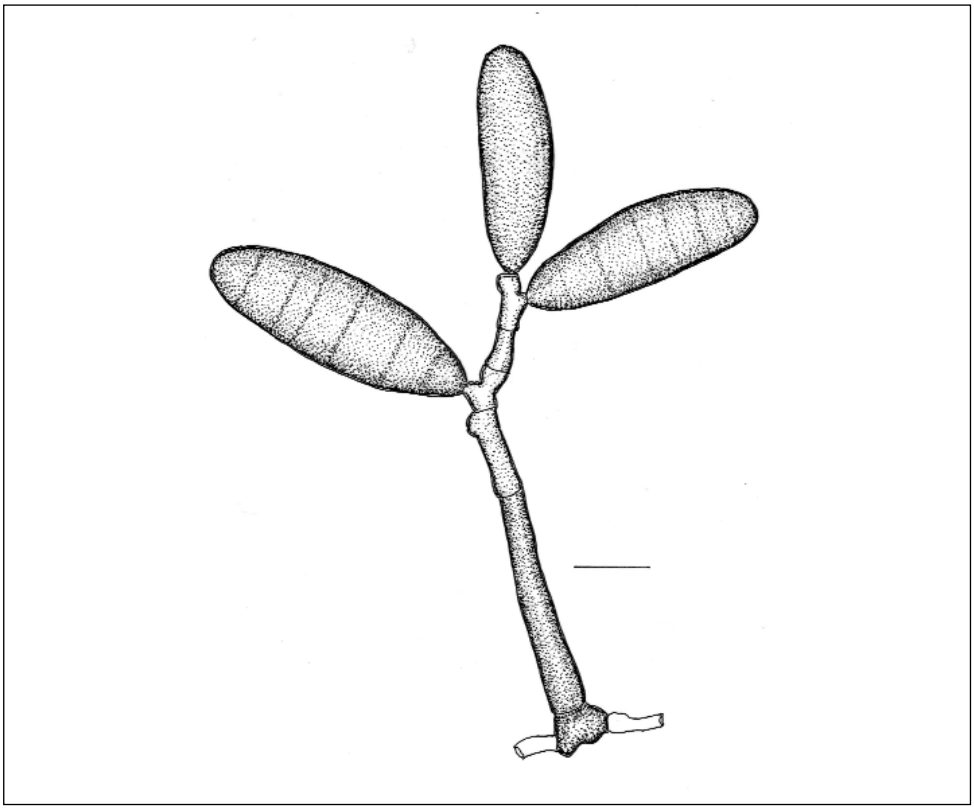

Fig. 7. *Bipolaris* sp. Conidiophore and conidia. Bar 12 µm.

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Periconia digitata (Cooke) Sacc., 1886
Type species: *Periconia lichenoides* Tode ex Mérat, 1791.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, frequently branched at the apex, straight, or gently flexuous, dark brown, smooth, septate, 560-670×14 µm near the base. Conidiogenous cells monoblastic, discrete, determinate, subspherical. Conidia in basipetal chains, simple, spherical, brown, dark brown, at the apex of the conidial chain slightly verruculose, 0-septate, 7-8×7 µm. On dead leaves of *Arundo donax* L.

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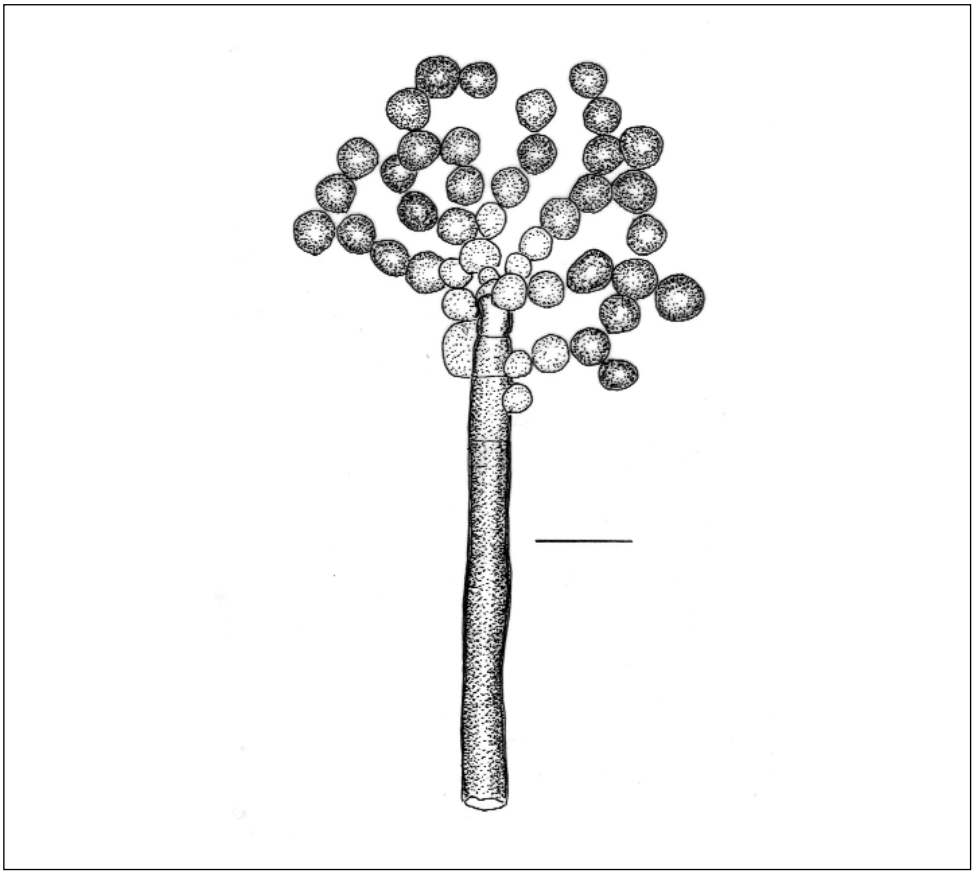

Fig. 8. *Periconia digitata*. Conidiophore and conidia in basipetal chains. Bar 20 µm.

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Acumispora fragmospora Matsushima, 1980.
Type species: *Acumispora uniseptata* Matsushima, 1980.

Colonies inconspicuous, composed by isolated conidiophores growing on dead mycological structures like setae or conidiophores. Conidiophores macronematous, mononematous, solitary, repeatedly branched (branches up to 22x4 µm), clear brown or clear olivaceous brown, up to 40-41×4 µm. Conidiogenous cells sympodially elongating. Conidia cylindrical, with pointed apex and rounded base, without protuberant hilum, 5-septate, clear brown or clear olive brown, smooth, 36-38×5 µm.
On dead leaves of *Pistacia lentiscus* L.

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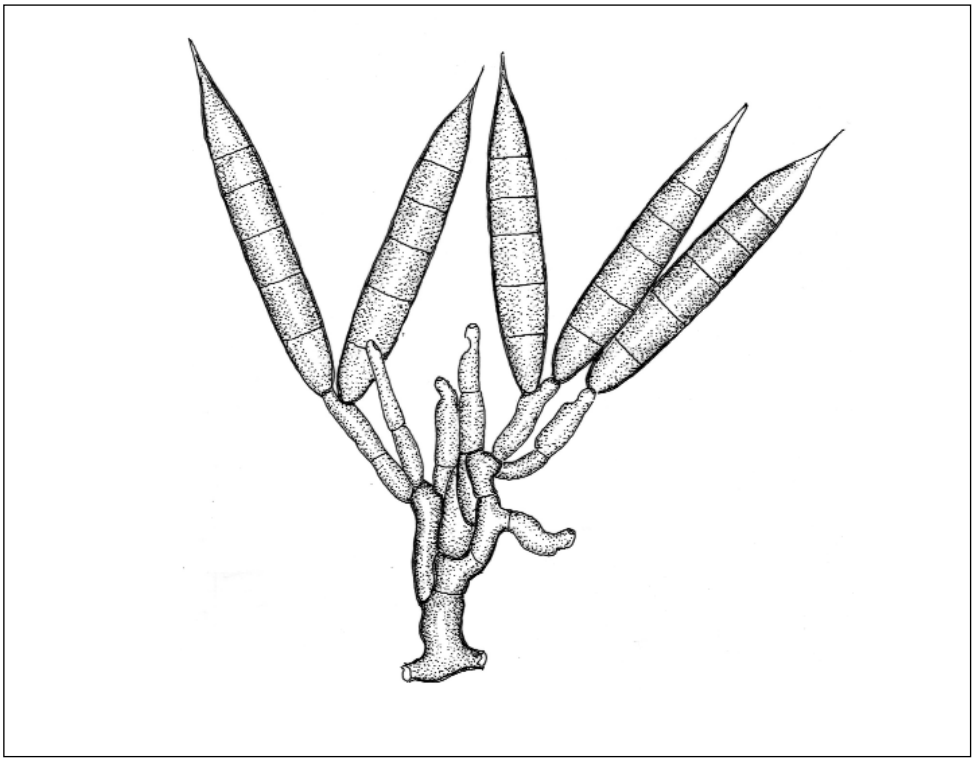

Fig. 9. *Acumispora fragmospora*. Branched conidiogenous cells and conidia. Bar 8 μm.

Dendryphion comosum Wallr., 1833.
Type species: *Dendryphion comosum* Wallr., 1833.

Colonies inconspicuous, composed by isolated conidiophores. Conidiophores macronematous, mononematous, erect, straight, brown, clearer towards the apex, smooth, 270-330×14-16 μm, repeatedly branched at the apex, branches mid brown, smooth, 13×8 μm. Conidiogenous cells polyblastic, sympodial, cycatrized, clear brown. Conidia composed by 3-5 cells constricted at the septa, cylindrical, rounded at the apices, in acropetal chains, clear brown, verruculose, 14-20×6 μm.
On dead leaves of *Phillyrea latifolia* L.

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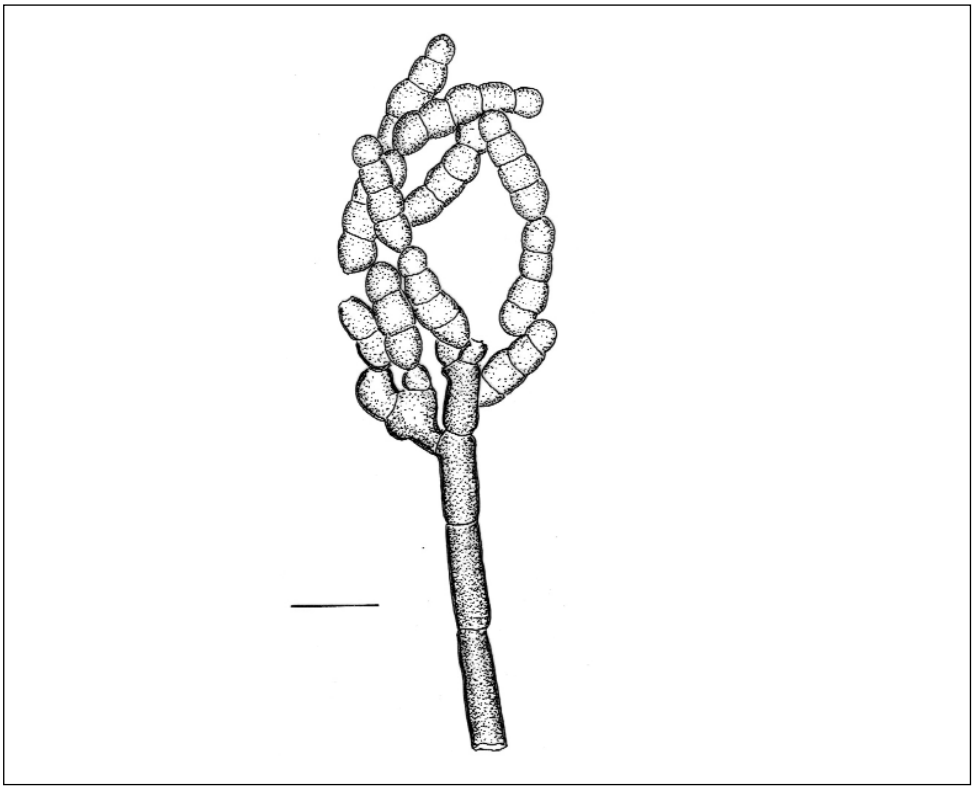

Fig. 10. *Dendryphion comosum*. Conidia composed by 4 or 5 cells in acropetal chains. Bar 16 µm.

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Matsushimaea fasciculata (T. Matsushima) Subramanian, 1977.
Type species: *Matsushimaea fasciculata* (T. Matsushima) Subramanian, 1977.

Colonies effuse, olivaceous-gray. Conidiophores absent or micronematous. Conidia originating from superficial hyphae, composed by columns of 10-12 spherical cells clear

brown, smooth and disposed in basipetal chains, up to 28-32 µm long and up to 4 µm wide, frequently diverging irregularly.
On dead leaves of *Pistacia lentiscus* L.

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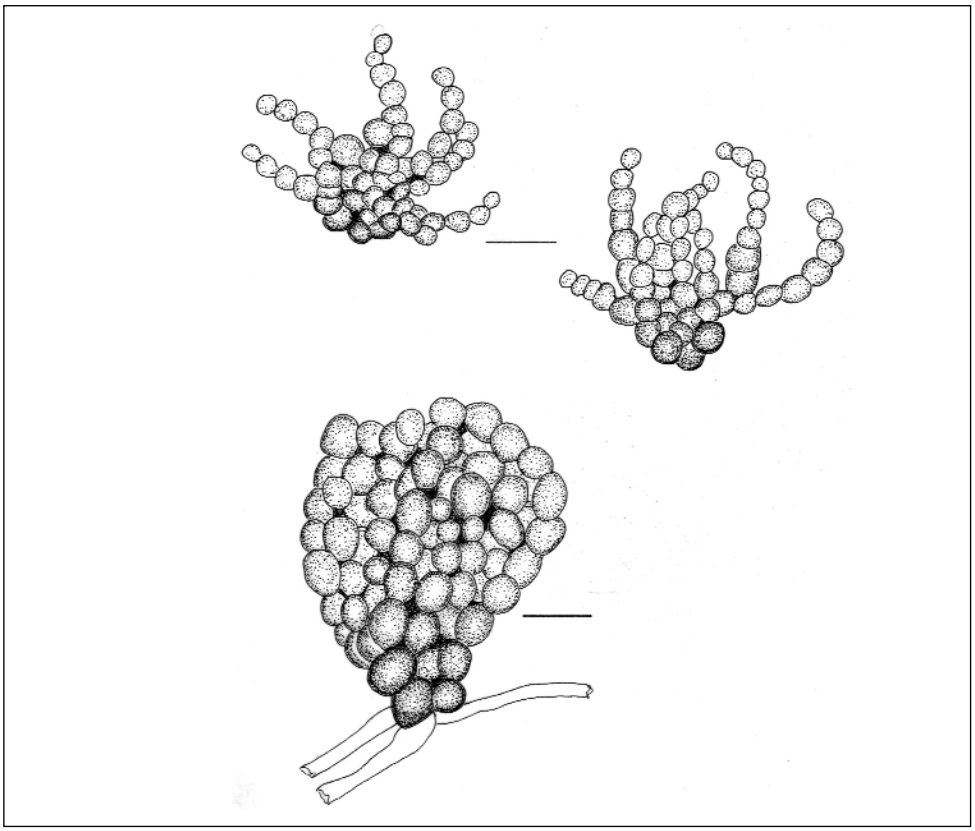

Fig. 11. *Matsushimaea fasciculata*. Up, bar 15 µm; down, bar 20 µm.

Idriella sp.
Type species: *Idriella lunata* Nelson & Wilhelm, 1956.

Colonies effuse, composed by very crowded conidiophores of different size and appearing white for an abundant production of conidia at the apex of the conidiophores and at the base. Conidiophores of two types macronematous and micronematous, acroauxic, the former brown, dark brown, with 2 or 3 annellations, clearer at the apex after one annellation immediately under the conidiogenous cell, repeatedly branched, 120-240×4-5 μm. The second type is represented by smaller conidiophores without branches, with 1 or 2 annellations, the highest is delimiting the conidiogenous cells, they are brown, clear brown, smooth, septate, up to 40x2 μm. A third side of conidial production is carried out by micronematous conidiophores producing short conidiogenous cells from the superficial hyphae on the natural substratum. This abundant production of conidia gives rise to a white and continue layer of conidia just at the base of the two mentioned conidiophores.

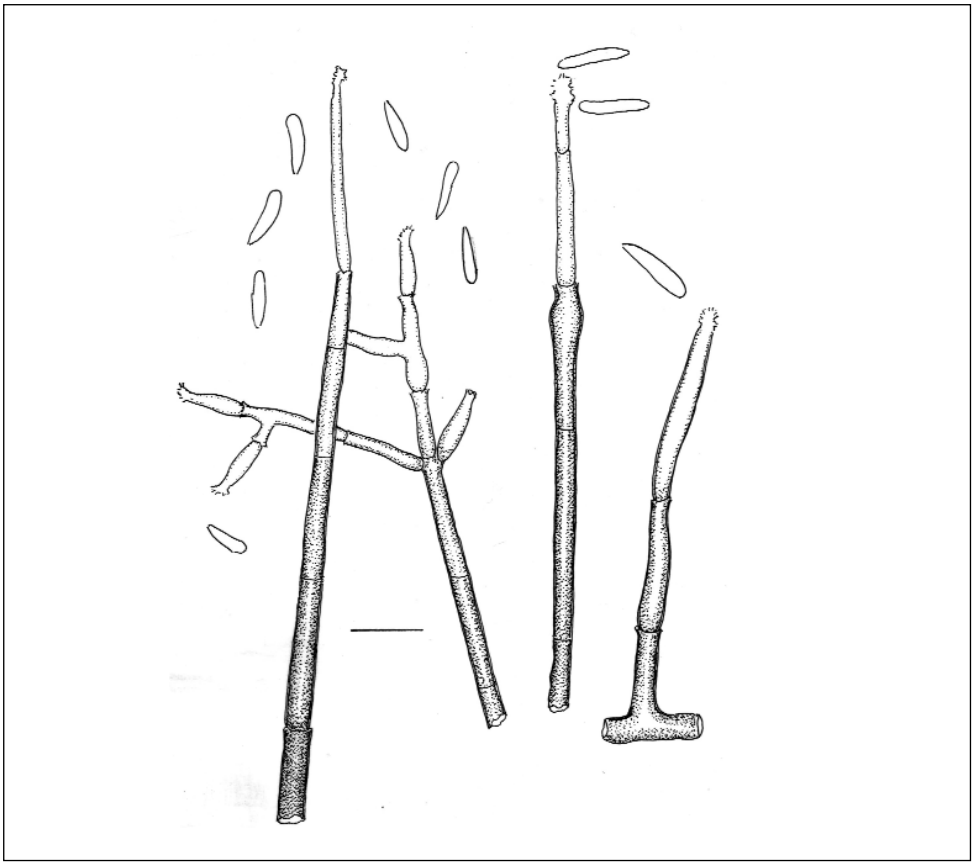

Fig. 12. *Idriella* sp. Conidiophores of different morphology. Bar 8 μm.

Conidiogenous cells originating after the highest annellation, clear brown, smooth, sympodially denticulated, 11-27×2 μm and denticulated part 5-9×1.8 μm. Conidia acrogenous, solitary, clavate, gently falcate, rounded at the apex and pointed at the base, hyaline, smooth, 0-septate, remaining at the apex of the different levels of conidiogenous cells and forming a white layer at the base, 7-9×1.8 μm.
On dead leaves of *Pinus domestica.*

The species described presents a conidial production from very different conidiophores inconstant and variable in the morphological characters and dimensions. The inclusion in the genus *Idriella* seems the most convenient for the apical, sympodial, denticulated conidiogenous cells, even if the percurrent elongation of the conidiophores and the production of a clearer conidiogenous cells immediately after the most apical annellation seems more characteristic of *Pleurotheciopsis* that however does not include species with branched conidiophores.

Nevertheless, considering "pro tempore" the inclusion of this specimens into the genus *Idriella*, we hope to find more material and to have the opportunity to reconsider its taxonomic position.

Conclusions

The area examined is characterized by a constant humidity determined by the near Lesina lake and the Adriatic coast, environmental conditions that in spring and summer are responsible for a rapid microfungal colonization and transformation of the vegetal organic material. This is proved by the very thin layer of litter under the different plants of the area. At present we have found only 12 species 3 not determined and we hope to have the possibility of reconsider with new samplings.

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Databases online

Index Fungorum
(CABI) http://www.indexfungorum.org

Addresses of the authors:
Angelo Rambelli[1], Claudio Ciccarone[2], Giuseppe Venturella[3], Sabrina Tempesta[1*]
[1] DECOS, Università della Tuscia, Largo dell'Università - 01100 Viterbo, Italy
[2] DiSACD, via Napoli 25; Bioagromed, via Napoli 52, Facoltà di Agraria dell'Università, 71100 Foggia, Italy
[3] Dipartimento di Scienze Botaniche, Via Archirafi 38 - 90123 Palermo, Italy.
[*] Corresponding author.