Screening of Spore Ornamentation of Some Mushrooms

Bazı Mantarların Spor Yapılarının İncelenmesi

Research Article

Perihan Güler[1*], Aziz Türkoğlu[2]
[1]Kırıkkale University, Faculty of Arts and Science, Department of Biology, Kırıkkale, Turkey.
[2]Muğla Sıtkı Koçman University, Faculty of Science, Department of Biology, Muğla, Turkey.

ABSTRACT

In this study, spores of twelve basidiomycetes species were examined. These species were collected from Kırıkkale-Turkey in the year of 2012 at autumn and spring. The collected samples were brought in the laboratory and mushrooms were dried in aseptic conditions. They were examined morphologically and anatomically. The spores of *Laetiporus sulphureus*, *Cortinarius cotoneus*, *Boletus erythropus*, *Ganoderma lucidum*, *Coprinus disseminatus*, *Psathyrella candolleana*, *Volvariella pusilla*, *Schizophyllum commune*, three *Inocybe* spp. that *I. dunensis*, *I. dulcamara*, *I. praetervisa* and *Phellinus hartigii* were investigated.

Key Words
Basidiomycetes, spore ornemantation, mushrooms.

ÖZET

Bu çalışmada, 12 Basidiomycetes türünün sporları incelendi. Bu türler Kırıkkale-Türkiye'den 2012 yılında ilkbahar ve sonbahar döneminde toplandı. Toplanan örnekler laboratuvara getirildi ve mantarlar aseptik koşullarda kurutuldu. Kurutulan numuneler anatomik ve morfolojik olarak incelendi. *Laetiporus sulphureus*, *Cortinarius cotoneus*, *Boletus erythropus*, *Ganoderma lucidum*, *Coprinus disseminatus*, *Psathyrella candolleana*, *Volvariella pusilla*, *Schizophyllum commune*, three *Inocybe* spp. that *I. dunensis*, *I. dulcamara*, *I. praetervisa ve Phellinus hartigii* nin sporları incelendi.

Anahtar Kelimeler
Basidiomycetes, Spor yapısı, mantarlar.

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Correspondence to: P. Güler, Kırıkkale University, Faculty of Arts and Science, Department of Biology, Kırıkkale, Turkey.
Tel: +90 318 357 4242/4152 Fax: +90 318 357 2461 E-Mail: perihanguler71@gmail.com

INTRODUCTION

Kırıkkale province is located in the Central Anatolia Region of Turkey. Neighbors are in the East Çorum, Yozgat, in the south Kırşehir, in the west Ankara and in the north Çankırı. Kızılırmak is the most important river of Kırıkkale. 94 km section of the Kızılırmak River is located within the city limits. Kızılırmak passes through the city especially south and west (Figure 1) [1]. Kırıkkale has a continental climate harsh. Winters are cold and summers are warm. The temperature is between +39°C and -21°C, the average temperature at around 13°C. The average rainfall of 329 mm. Part of its territory is covered with forests of oak. In this study, the anatomical structures of spores of twelve basidiomycetes species of Kırıkkale-Turkey have been investigated.

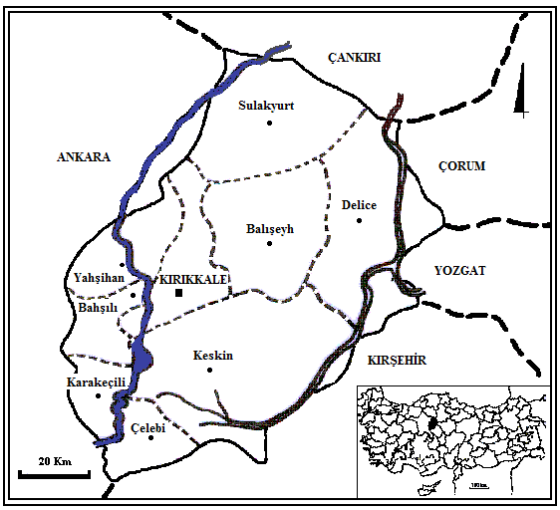


Figure 1. The map of research area (1).

MATERIAL AND METHODS

Organisms

In this study, mushrooms were collected at different locations from Kırıkkale-Turkey. All samples were collected in spring and autumn period in 2011. Lists of organisms are below:

Laetiporus sulphureus (Bull.) Murrill, *Cortinarius cotoneus* Fr., *Boletus erythropus* Pers, *Ganoderma lucidum* (Curtis) P. Karst., *Coprinus disseminatus* (Pers.) Gray, *Psathyrella candolleana* (Fr.) Maire, *Volvariella pusilla* (Pers.) Singer, *Schizophyllum commune* Fr., *Inocybe dunensis* P.D. Orton, *Inocybe dulcamara* (Pers.) P. Kumm., *Inocybe praetervisa* Quél. and *Phellinus hartigii* (Allesch. & Schnabl) Pat.

Anatomical Studies

Light Microscopy studies

Light microscopy studies were maintained with Zeiss (40x) that was present at Kırıkkale University Faculty of Arts and Sciences.

Electron microscopy studies

Scanning electron microscope (SEM) examinations were performed with Scanning Electron Microscopy with the JEOL 5600 microscope presenting Kırıkkale University, Electron Microscopy Laboratory. basidiomycetes spores were in $KMnO_4$, dehydrated in acetone, critical point trated coated with gold [2].

Spores description

The description of basidiomycetes spores are based on identification according to Ainsworth et al. [3] and Ainsworth and Bisby [4].

RESULTS AND DISCUSSION

Laetiporus sulphureus (Bull.) Murrill

Spores are oval to elliptic, 3.5-4.2x4.15-4.40 µm, smooth, hyaline (Figure 2) 5-8x3.5-5 µm. [5], and colorless, elliptical to almost round [6,7] reported that white, smooth, broadly elliptical to nearly round.

Cortinarius cotoneus Fr.

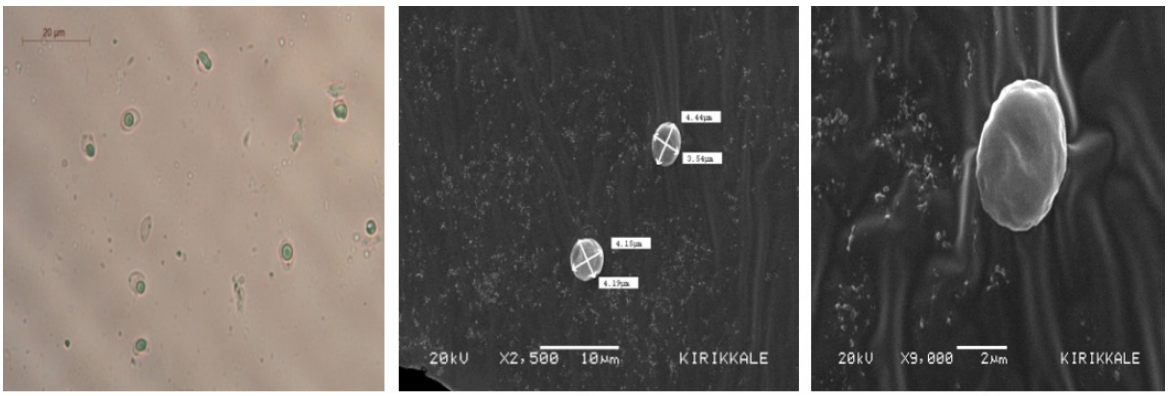
Spores are rusty brown, slightly elliptical, 4.5-6.5x7.5-8 µm (Figure 3) 7-9x6.6-7.5 µm [7,8].

Boletus erythropus Pers.

Spores are 5.5x14 µm, print olive-brown to ochraceous-brown (Figure 4). They are also 12-16x4-6 µm, elliptical to spindle shaped, smooth [7].

Ganoderma lucidum (Curtis) P. Karst.

Spores are 5.5-6x8-9 µm. elliptical (Figure 5). They are also 10-12x6-8 µm brown, elliptical [6-8].



A B C

Figure 2. Anatomical structure of *Laetiporus sulphureus* A- Light microscopy, B-C- Scanning Electron microscopy.

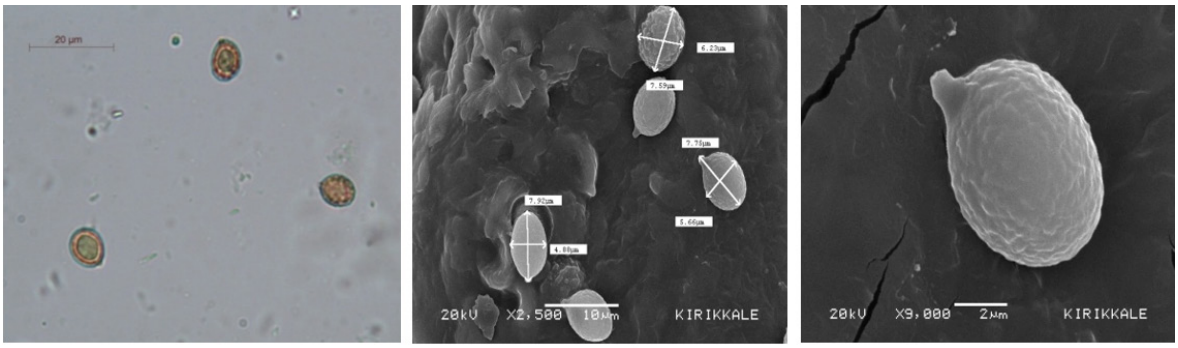


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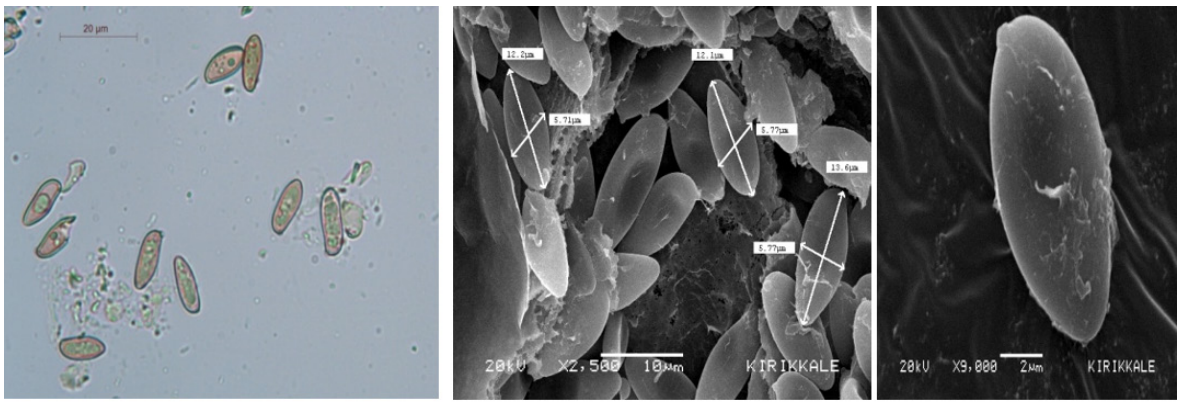
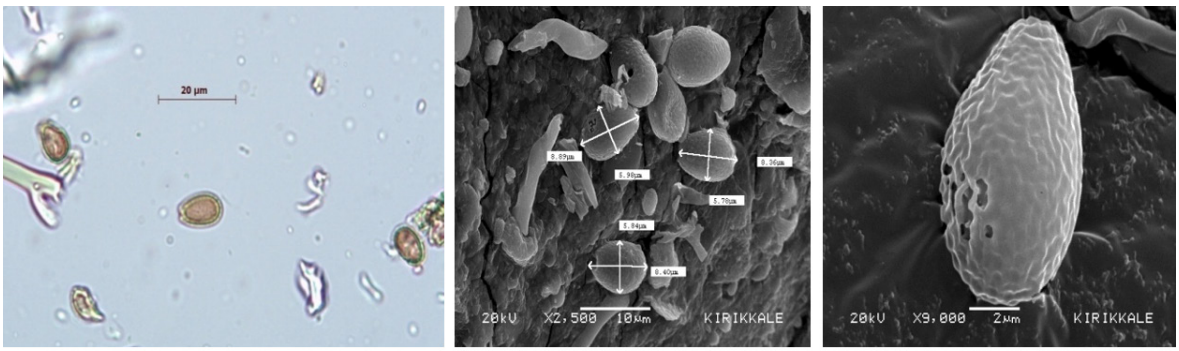
Figure 3. Anatomical structure of *Cortinarius cotoneus* A- Light microscopy, B-C- Scanning Electron microscopy.



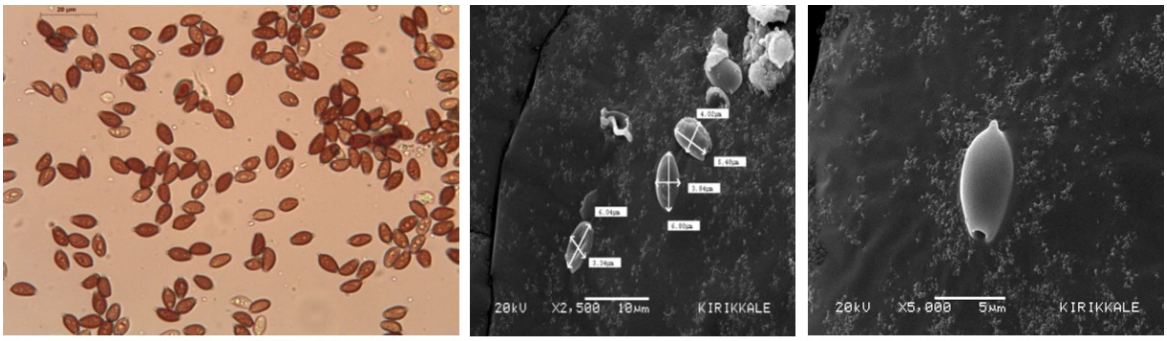
A B C

Figure 4. Anatomical structure of *Boletus erythropus* A- Light microscopy, B-C- Scanning Electron microscopy.



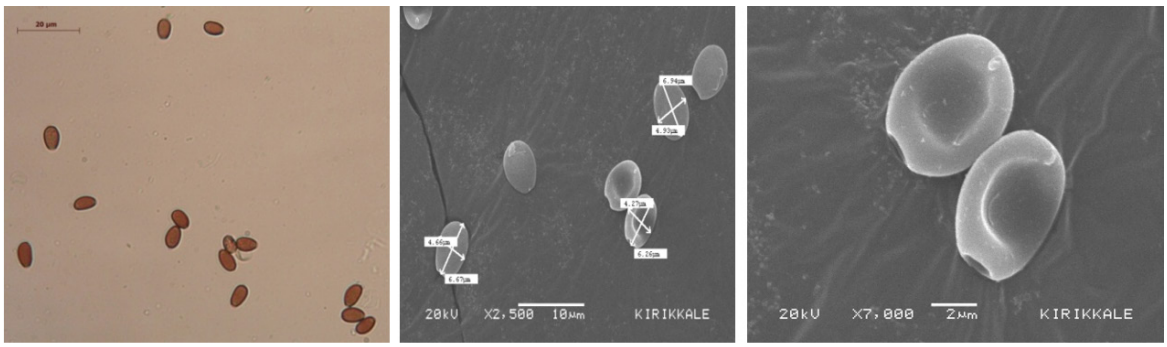
A B C

Figure 5. Anatomical structure of *Ganoderma lucidum* A- Light microscopy, B-C- Scanning Electron microscopy.



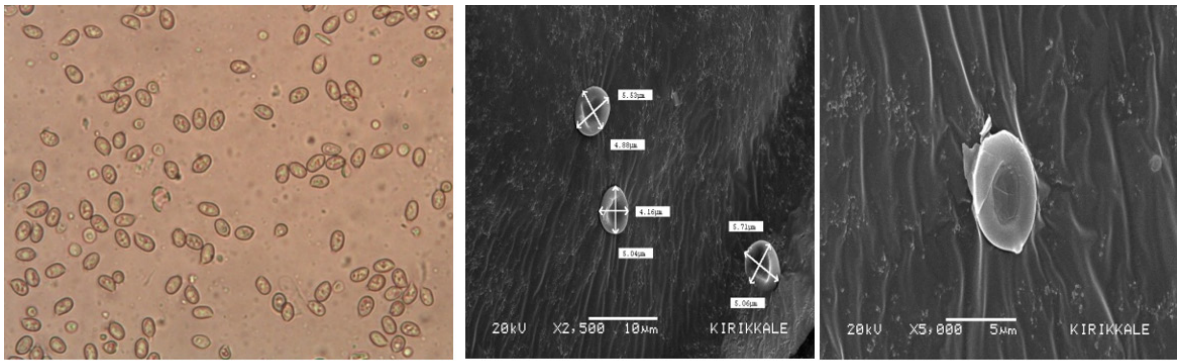
A B C

Figure 6. Anatomical structure of *Coprinus disseminatus* A- Light microscopy, B-C- Scanning Electron microscopy.



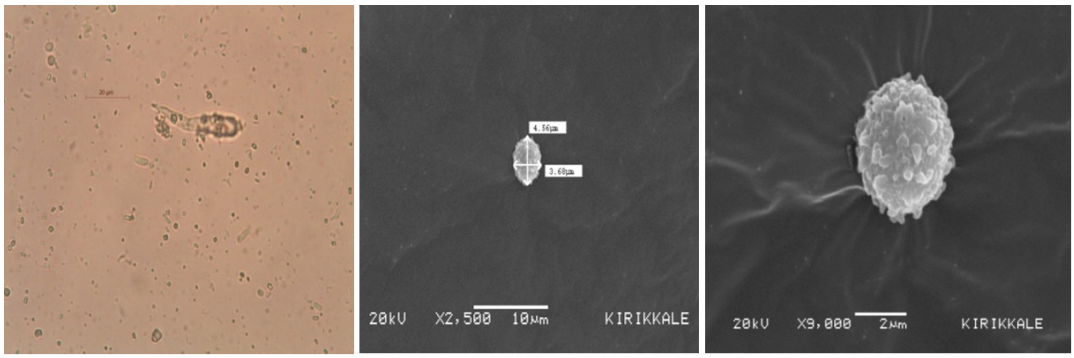
A B C

Figure 7. Anatomical structure of *Psathyrella candolleana* A- Light microscopy, B-C Scanning Electron microscopy.



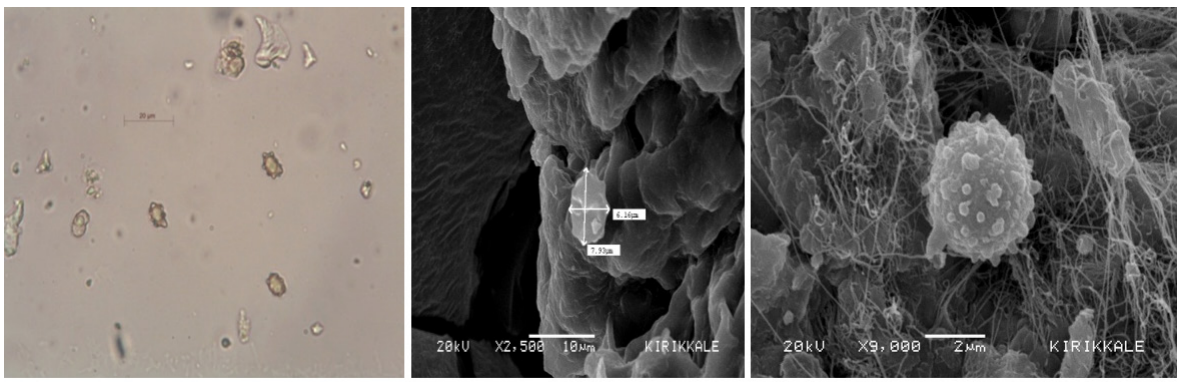
A B C

Figure 8. Anatomical structure of *Volvariella pusilla* A- Light microscopy, B-C Scanning Electron microscopy.



A B C

Figure 9. Anatomical structure of *Schizophyllum commune* A- Light microscopy, B-C Scanning Electron microscopy.



A B C

Figure 10. Anatomical structure of *Inocybe dunensis* A- Light microscopy, B-C Scanning Electron microscopy.

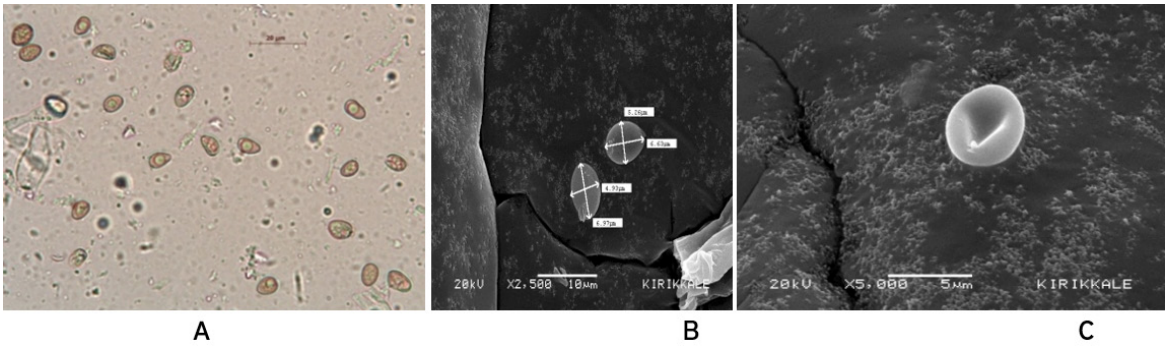


Figure 11. Anatomical structure of *Inocybe dulcamara* A- Light microscopy, B-C Scanning Electron microscopy.

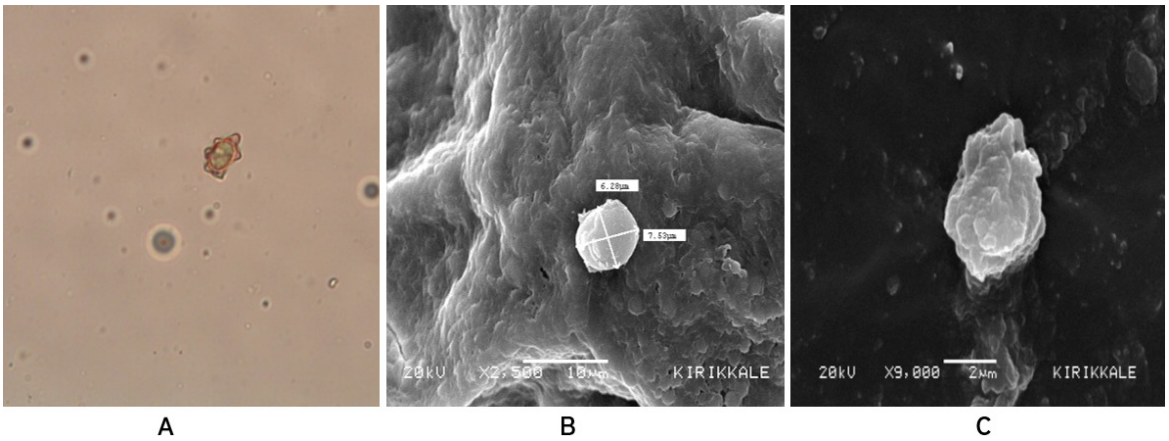


Figure 12. Anatomical structure of *Inocybe praetervisa* A- Light microscopy, B-C Scanning Electron microscopy.

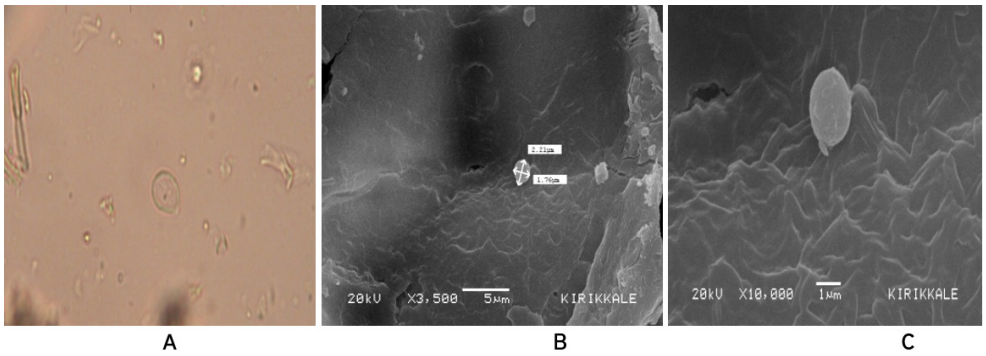


Figure 13. Anatomical structure of *Phellinus hartigii* A- Light microscopy, B-C Scanning Electron microscopy.

***Coprinus disseminatus* (Pers.) Gray**

Spores are 3-4.2x5-7 μm., elliptical (Figure 6). They are also 9-10x5-6 μm, blackish, elliptical, smooth [6,8]; dark brown to black elliptical, smooth, with a large germ pore [7].

***Psathyrella candolleana* (Fr.) Maire**

Spores are 4-5x6-7 μm oval to elliptic (Figure 7). They are also 6.5-9x4.5-5.5 μm, oval to elliptic, smooth, with an apical pore, pale brown [5], purplish brown , 7-10x4-5 μm smooth, elliptical with germ pore [6,9]; deep brown , elliptic, smooth [7].

***Volvariella pusilla* (Pers.) Singer**

Spores are oval, 4-5.5x5-6 μm. (Figure 8). They are also smooth, hyaline, 5.5-8x4-6 μm [5] and elliptical [6].

***Schizophyllum commune* Fr.**

Spores cylindric, smooth, 3.5x5 μm (Figure 9). Hyaline, smooth, 5-7.5 x 2-3 μm, [4], white, smooth 3-4x1-1.5 μm [6-8].

***Inocybe dunensis* P.D. Orton**

Spores are 6x8 μm (Figure 10). They are also 10.0-11.5(–12)x6.5–7.5 μm , yellowish [10], brown [11].

***Inocybe dulcamara* (Pers.) P. Kumm.**

Spores are 4.5-5.5x6.5-7 μm (Figure 11). They are also 10-12 μmx 7-9 μm , brown [11].

***Inocybe praetervisa* Quél**

Spores are 6x8 μm (Figure 12). Light to dark brown 10-12 μmx 7- 9 μm [12].

***Phellinus hartigii* (Allesch. & Schnabl) Pat.**

Spores are 1.5x2.5 μm (Figure 13). They are also smooth, 6.5x6.1 μm.

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