

## **Ecology and distribution of hypogeous fungi from Sicily (southern Italy)**

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**Abstract** – The distribution and ecology of 39 hypogeous and semi-hypogeous fungi is reported. Ten taxa, including the rare *Fischerula macrospora*, are new records for Sicily, while the presence of some species, previously reported by Oreste Mattiolo, is confirmed.

**Hypogeous fungi / Distribution / Ecology / Sicily**

**Résumé** – Cette étude répertorie les données sur la distribution et l'écologie de 39 taxa hypogés et semi-hypogés recueillis en Sicile. Dix de ces champignons, parmi lesquels le rare *Fischerula macrospora*, n'ont jamais été observés en Sicile, et certaines espèces déjà signalées par Oreste Mattiolo ont été retrouvées.

**Champignons hypogés / Distribution / Écologie / Sicile**

### **INTRODUCTION**

This is the second survey provided by a research team accompanied by dogs trained in the search of hypogeous fungi from Sicily (southern Italy). In a previous paper the distributive and ecological data on thirty-five hypogeous and semi-hypogeous fungi were reported by Venturella *et al.* (2004). Field investigation in different forest ecosystems of Sicily were carried out by the research team in more recent times in order to: a) widen the knowledge on hypogeous fungi, b) confirm data reported by authors in literature and c) provide for the first time distribution maps of species recorded in the region.

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## MATERIALS AND METHODS

A number of different forest ecosystems, located at different altitudinal levels, were investigated in Sicily during the period February 2004-December 2005. The identification of hypogeous fungi was carried out on fresh ascomata and basidiomata, and the microscopic features were observed in an aqueous solution with a Leica microscope. The scientific binomials and trinomials of recorded taxa were referred to the monograph of Montecchi & Sarasini (2000). The date and localities of collection, cartographic references, habitats and altitudes of each taxa were listed in the paragraph of data recorded included in this paper. The distributive data were referred to the grid map 1:50,000 of the Official Map of the Italian State (I.G.M.I.), following the methodology proposed by Padovan (1994) for the compilation of the check-list of Italian *Basidiomycetes*. The distribution maps were elaborated in a database according to literature informations and new data here reported. The herbarium specimens are kept in the *Herbarium Mediterraneum* (PAL).

## DATA RECORDED

### ***Balsamia vulgaris* Vittad.** (Fig. 1)

**Monreale:** Monte Petroso (San Martino delle Scale), 663 m, 594214-594422, 19 Feb 2005, mixed wood of *Quercus ilex* L., *Q. suber* L., *Pinus pinea* L. with plants of *Erica multiflora* L. and *Cistus creticus* L. in the underwood; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana* (Ten.) Ten.

### ***Fischerula macrospora* Mattir.** (Photo 1, Fig. 2)

**Cinisi:** Bosco Santo Canale, 730 m, 594422, 08 Jul 2005, wood of *Q. ilex*; **Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 03 Jul 2005, mixed wood of *Quercus leptobalanos* Guss. and *Q. ilex*.

### ***Genea fragrans* (Wallr.) Paoletti** (Fig. 3)

**Cinisi:** Bosco Santo Canale, 730 m, 594422, 19 Feb 2005, 16 Apr 2005, wood of *Q. ilex*; **Isnello:** Piano Zucchi, 865 m, 609122, 31 Oct 2004, wood of *Q. ilex*; **Noto:** Feudo Bauli, 605 m, 645224, 02 Nov 2004, wood of *Q. ilex*; **Polizzi Generosa:** Pizzo Colla, 1676 m, 609211, 31 Oct 2004, wood of *Fagus sylvatica* L.; Santa Nicola, 658 m, 609221, 30 Oct 2004, 19 Jun 2005, scattered plants of *Q. pubescens* at the border of tilled field; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 22 Feb 2005, 14 Apr 2005, 30 Giu 2005, mixed wood of *Q. ilex* and *Q. virgiliana*.

### ***Genea sphaerica* Tul. & C. Tul.** (Fig. 4)

**Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 05 Jul 2004, mixed wood of *Quercus leptobalanos* and *Q. ilex*; **Isnello:** Piano Zucchi, 865 m, 609122, 01 Jul 2004, 31 Oct 2004, wood of *Q. ilex*; **Vizzini:** S.P. 124 Km 51, 603 m, 645413, 16 Jun 2005, scattered plants of *Q. pubescens* at the border of the main road.

### ***Genea verrucosa* Vittad.** (Fig. 5)

**Alcamo:** Monte Inici, 1064 m, 593233, 15 Jun 2004, wood of *Q. ilex*; **Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342; 05 Jul 2004, mixed wood of



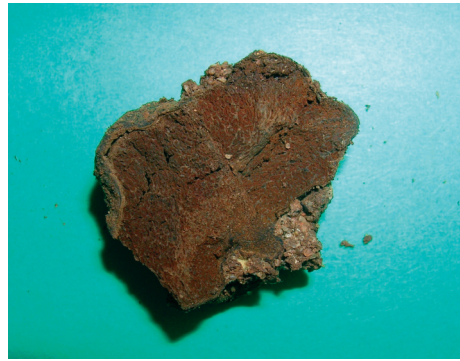
**Photo 1** – *Fischerula macrospora*



**Photo 2** – *Geopora cooperi*



**Photo 3** – *Hydnocystis clausa*



**Photo 4** – *Hymenogaster bulliardii*



**Photo 5** – *Hymenogaster calosporus*



**Photo 6** – *Hymenogaster griseus*

*Q. leptobalanos* and *Q. ilex*; **Isnello**: Bevaio del Faggio, 1355 m, 609211-610344, 20 Oct 2005, in the glades of beech woods reafforested with *Cedrus atlantica* (Endl.) Manetti and *Pinus nigra* Arnold; **Longi**: Crocetta, 630 m, 599323, 14 Jun 2005, mixed wood of *Q. ilex*, *Q. virgiliana*, *Osryta carpinifolia* Scop., *Acer campestre* L. and *Fraxinus ornus* L.; **Monreale**: Monte Petroso (San Martino delle Scale), 663 m, 594214-594422, 21 Feb 2005, 18 Jun 2005, mixed wood of *Q. ilex*, *Q. suber*, *P. pinea* with plants of *Erica multiflora* and *Cistus creticus*



**Photo 7** – *Leucogaster nudus*



**Photo 8** – *Stephensia bombycina*



**Photo 9** – *Tuber rufum* f. *nitidum*

in the underwood; Pizzo del Corvo (San Martino delle Scale), 766 m, 594214, 19 Feb 2005, reafforestation of *P. pinea* with some plants of *Q. ilex*; **Noto**: Feudo Bauli, 605 m, 645224, 15 Jun 2005, wood of *Q. ilex*; **Palermo**: Bosco di Niscredi (Parco della Favorita), 43-48 m, 595443, 22 Feb 2005, wood of *Q. ilex*; **Termini Imerese**: Monte San Calogero, 690 m, 609431, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*.

***Geopora cooperi* Harkn.**

(Photo 2, Fig. 6)

**Polizzi Generosa**: Quacella, 1103 m, 610334-610343, 31 Oct 2004, reafforestation of *Cedrus atlantica*.

***Hydnangium carneum* Wallr.**

(Fig. 7)

**Buseto Palizzolo**: Bosco Scorace, 560 m, 606414, 13 Apr 2004, mixed wood of *Pinus halepensis* Miller, *Cupressus sempervirens* L. and *Eucalyptus camaldulensis* Dehnh.

***Hydnocystis clausa* (Tul. & C. Tul.) Ceruti**

(Photo 3, Fig. 8)

**Monreale**: Monte Petroso (San Martino delle Scale), 663 m, 594214-594422, 19 Feb 2005, mixed wood of *Q. ilex*, *Q. suber*, *P. pinea* with plants of *Erica multiflora* and *Cistus creticus* in the underwood.

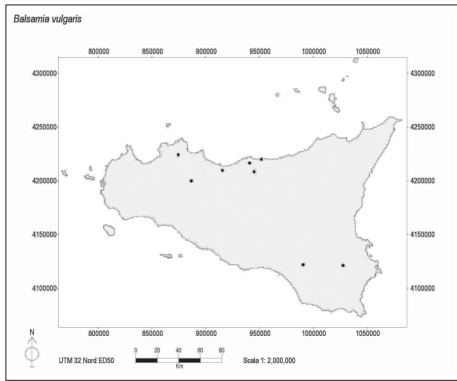


Fig. 1.

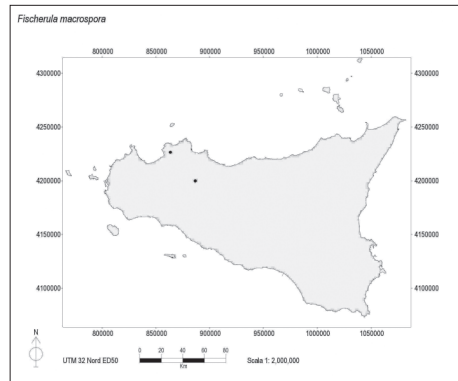


Fig. 2.

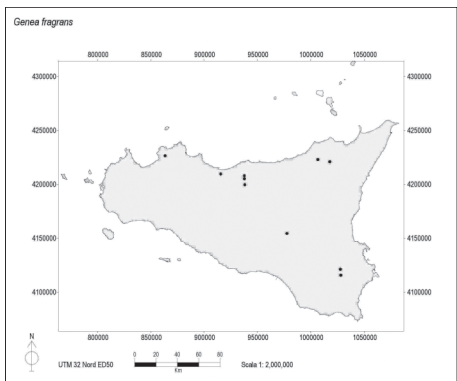


Fig. 3.

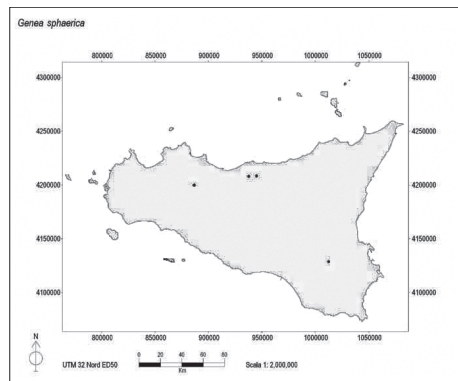


Fig. 4.

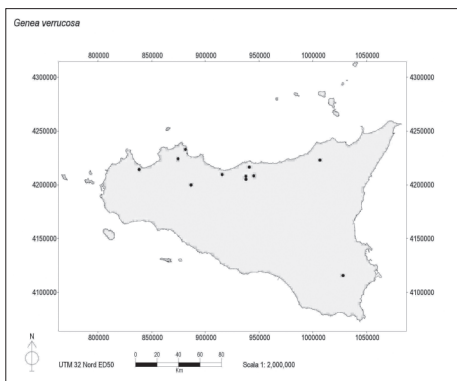


Fig. 5.

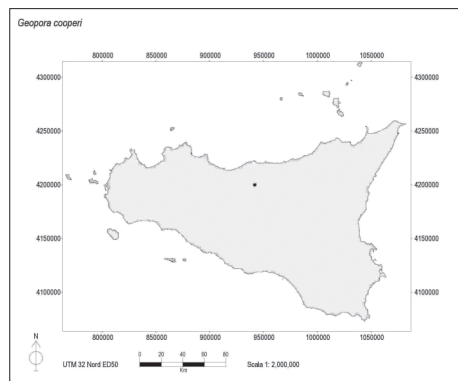


Fig. 6.

***Hydnocystis piligera* Tul. & C. Tul.** (Fig. 9)

**Termini Imerese:** Monte San Calogero (C.da Santa Maria), 776 m, 609431, 08 Nov 2004, mixed wood of *Q. ilex* and *Q. virgiliana*.

***Hymenogaster bulliardii* Vittad.** (Photo 4, Fig. 10)

**Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 05 Jul 2004, mixed wood of *Q. leptobalanos* and *Q. ilex*; **Palermo:** Parco della Favorita, 43-48 m, 595443, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*.

***Hymenogaster calosporus* Tul. & C. Tul.** (Photo 5, Fig. 11)

**Erice:** Monte Erice, 756 m, 592224, 21 Feb 05, mixed wood of *Q. ilex* and *Q. pubescens*.

***Hymenogaster citrinus* Vittad.** (Fig. 12)

**Termini Imerese:** Monte San Calogero (C.da Santa Maria), 776 m, 609431, 30 Jun 2004, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*; **Torretta:** Mandria Zarcati, 510 m, 594113, 19 Feb 2005, reforestation of *Cupressus sempervirens* and *Pinus pinea*.

***Hymenogaster decorus* Tul. & C. Tul.** (Fig. 13)

**Isnello:** Piano Zucchi, 865 m, 609122, 31 Oct 2004, wood of *Q. ilex*.

***Hymenogaster griseus* Vittad.** (Photo 6, Fig. 14)

**Erice:** Monte Erice, 756 m, 592224, 01 Nov 2004, mixed wood of *Q. ilex* and *Q. pubescens*.

***Hymenogaster hessei* Soehner** (Fig. 15)

**Cinisi:** Bosco Santo Canale, 730 m, 594422, 29 Oct 2004, wood of *Q. ilex*; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 14 Apr 2004, 30 Jun 2004, mixed wood of *Q. ilex* and *Q. virgiliana*.

***Hymenogaster luteus* Vittad.** (Fig. 16)

**Cinisi:** Bosco Santo Canale, 730 m, 594422, 16 Apr 2004, 29 Oct 2004, 19 Feb 2005, 01 Nov 2005, wood of *Q. ilex*; **Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 05 Jul 2004, mixed wood of *Q. leptobalanos* and *Q. ilex*; **Noto:** Feudo Bauli, 605 m, 645224, 02 Nov 2004, 15 Jun 2005, wood of *Q. ilex*; **Polizzi Generosa:** Piano della Madonna, 1692 m, 609211, 31 Oct 2004, wood of *Fagus sylvatica*; **Pizzo Colla,** 1676 m, 609211, 31 Oct 2004, wood of *Fagus sylvatica*; **Torretta:** Mandria Zarcati, 510 m, 594113, 29 Oct 2004, reforestation of *Cupressus sempervirens* and *Pinus pinea*.

***Hymenogaster lycoperdineus* Vittad.** (Fig. 17)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 26 Feb 2004, reforestation of *Pinus halepensis* and *P. pinea* with scattered plants of *Q. ilex*; **Monreale:** Monte Petroso (San Martino delle Scale), 663 m, 594214-594422, 19 Feb 2005, 21 Feb 2005, mixed wood of *Quercus ilex*, *Q. suber*, *Pinus pinea* with *Erica multiflora* and *Cistus creticus* in the underwood; **Isnello:** Piano Zucchi, 865 m, 609122, 29 Oct 2005, wood of *Q. ilex*; **Palermo:** Parco della Favorita, 43-48 m, 595443, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 14 Apr 2004, mixed wood of *Q. ilex* and *Q. virgiliana*.

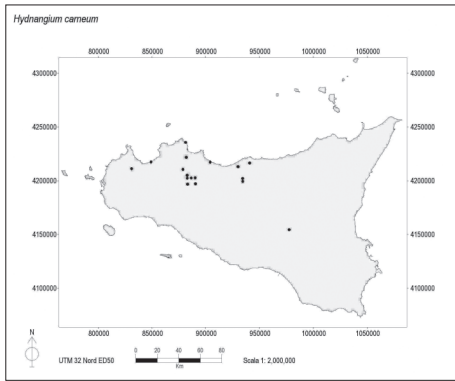


Fig. 7.

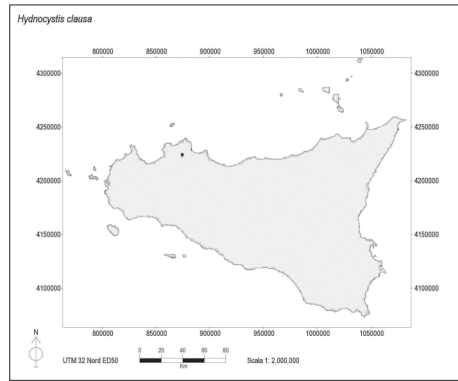


Fig. 8.

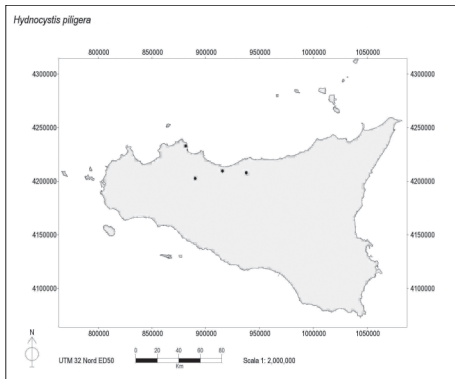


Fig. 9.

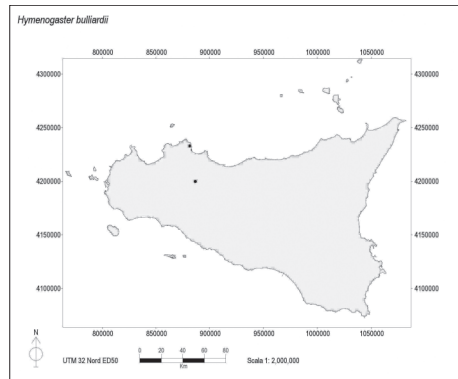


Fig. 10.

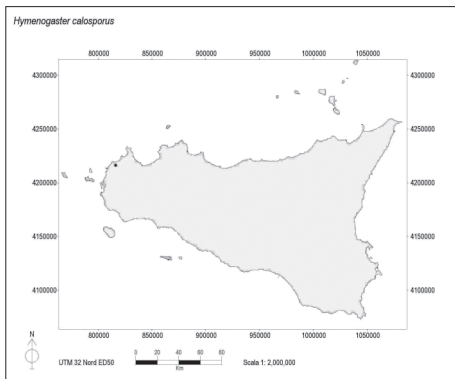


Fig. 11.

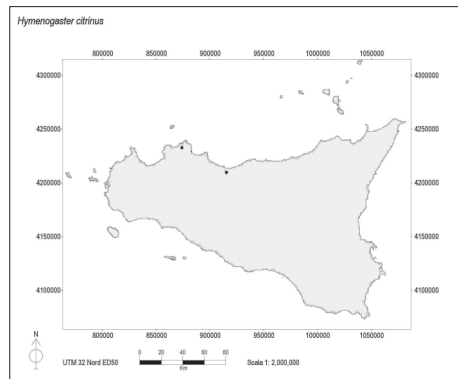


Fig. 12.

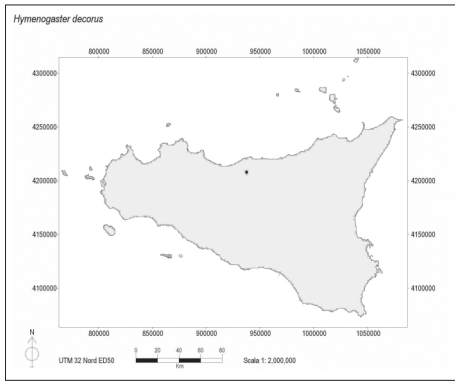


Fig. 13.

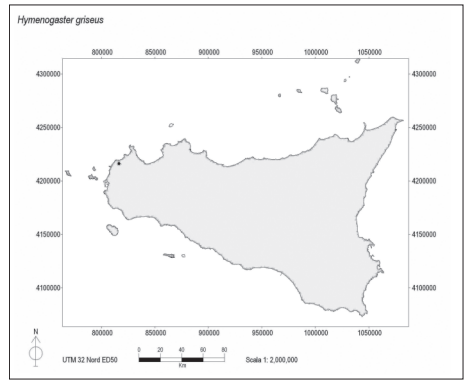


Fig. 14.

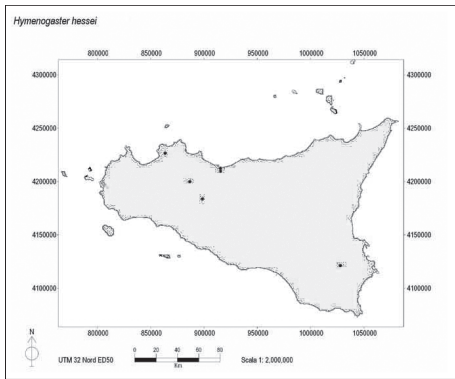


Fig. 15.

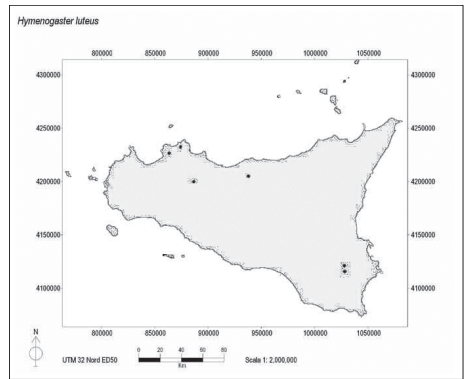


Fig. 16.

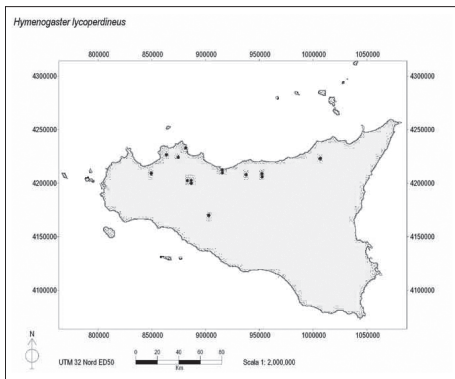


Fig. 17.

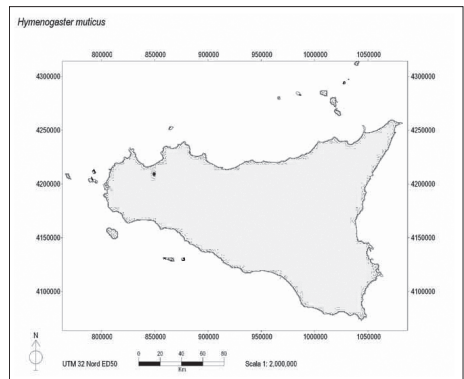


Fig. 18.



***Hymenogaster muticus* Berk. & Br.** (Fig. 18)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 21 Feb 2005, reafforestation of *Pinus halepensis* and *P. pinea* with scattered small plants of *Q. ilex*.

***Hymenogaster olivaceus* Vittad.** (Fig. 19)

**Longi:** Crocetta, 630 m, 599323, 14 Jun 2005, mixed wood of *Q. ilex*, *Q. virgiliana*, *Osryta carpinifolia*, *Acer campestre* and *Fraxinus ornus*; **Polizzi Generosa:** Santa Nicola, 658 m, 609221, 31 Oct 2004, scattered plants of *Q. pubescens* at the border of tilled field.

***Hymenogaster populetorum* Tul. & C. Tul.** (Fig. 20)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 21 Feb 2005, reafforestation of *Pinus halepensis* and *P. pinea* with small plants of *Q. ilex*; **Cinisi:** Bosco Santo Canale, 730 m, 594422, 16 Apr 2004, 29 Oct 2004, 19 Feb 2005, wood of *Q. ilex*; **Erice:** Monte Erice, 756 m, 592224, 21 Feb 2005, mixed wood of *Q. ilex* and *Q. pubescens*; **Isnello:** Piano Zucchi, 865 m, 609122, 31 Oct 2004, wood of *Q. ilex*; **Noto:** Feudo Bauli, 605 m, 645224, 02 Nov 2004, wood of *Q. ilex*; **Palermo:** Parco della Favorita, 43-48 m, 595443, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*.

***Hymenogaster rehsteineri* Bucholtz** (Fig. 21)

**Noto:** Feudo Bauli, 605 m, 645224, 02 Nov 2004, wood of *Q. ilex*.

***Hymenogaster vulgaris* Tul. & C. Tul.** (Fig. 22)

**Polizzi Generosa:** Santa Nicola, 658 m, 609221, 31 Oct 2004, scattered plants of *Q. pubescens* at the border of tilled field.

***Labyrinthomyces donkii* Malençon** (Fig. 23)

**Carini:** Piano di Santa Venera, 594422, 13 Apr 2004, reafforestation of *E. camaldulensis*; **Palermo:** Monte Pellegrino, 412 m, 595443-595444, 09 Apr 2004, reafforestation of *Eucalyptus camaldulensis*.

***Leucogaster nudus* (Hazsl.) Hollós** (Photo 7, Fig. 24)

**Polizzi Generosa:** Pizzo Colla, 1676 m, 609211, 31 Oct 2004, wood of *Fagus sylvatica*.

***Melanogaster variegatus* (Vittad.) Tul. & C. Tul.** (Fig. 25)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 17 Jun 2005, reafforestation of *Pinus halepensis* and *P. pinea* with scattered plants of *Q. ilex*; **Ciminna:** Serre di Ciminna, 699-777 m, 608241, 10 Nov 2005, grassland with *Cistus incanus* L., *Spartium junceum* L. and *Coronilla emerus* L.; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 14 Apr 2004, mixed wood of *Q. ilex* and *Q. virgiliana*.

***Pyrenogaster pityophilus* Malençon & Rioussset** (Fig. 26)

**Torretta:** Mandria Zarcati, 510 m, 594113, 19 Feb 2005, reafforestation of *Cupressus sempervirens* and *Pinus pinea*.

***Rhizopogon vulgaris* (Vittad.) M. Lange** (Fig. 27)

**Sambuca di Sicilia:** Cozzo del Serro, 491 m, 619321, 26 Feb 2005, reafforestation of *P. pinea*.

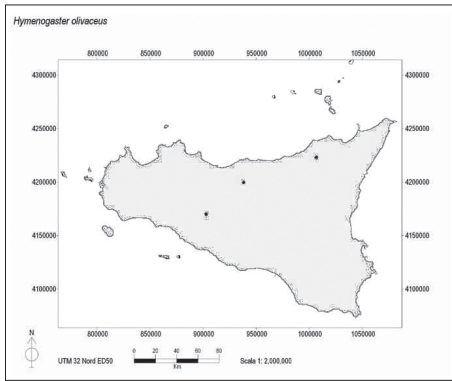


Fig. 19.

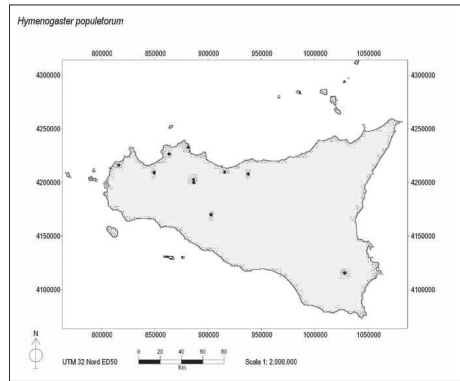


Fig. 20.

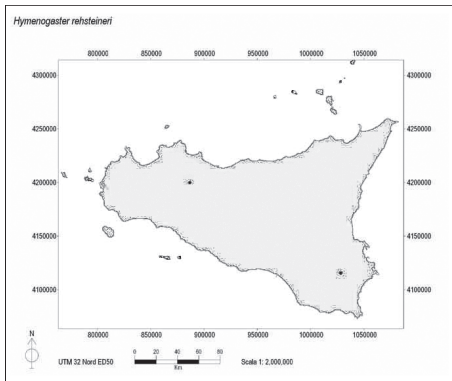


Fig. 21.

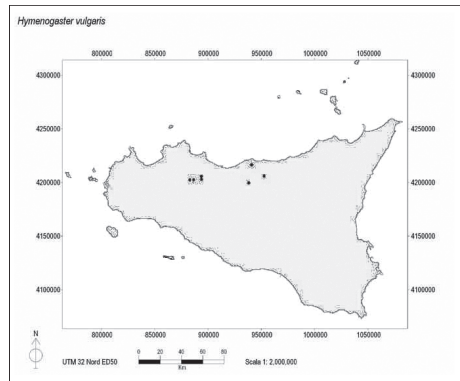


Fig. 22.

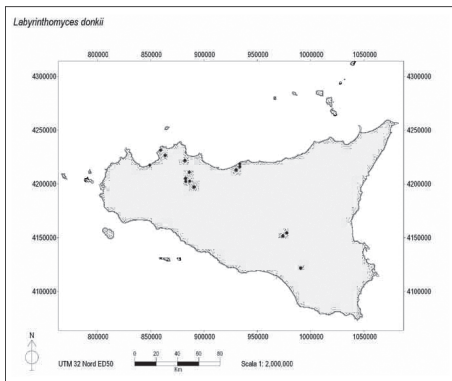


Fig. 23.

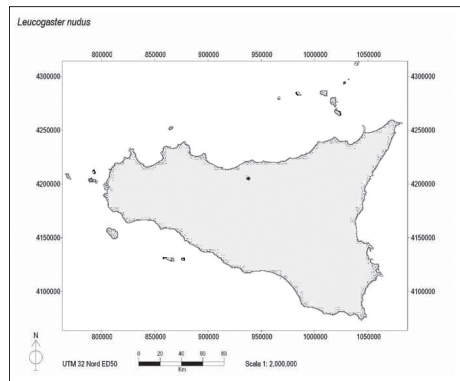


Fig. 24.

***Setchelliogaster tenuipes* (Setch.) Pouzar** (Fig. 28)

**Palermo:** Monte Pellegrino, 412 m, 595443-595444, 09 Apr 2004, 22 Feb 2005, reforestation of *Eucalyptus camaldulensis*.

***Stephensia bombycina* (Vittad.) Tul. & C. Tul.** (Photo 8, Fig. 29)

**Longi:** Crocetta, 630 m, 599323, 14 Jun 2005, mixed wood of *Q. ilex*, *Q. virgiliana*, *Osryta carpinifolia*, *Acer campestre* and *Fraxinus ornus*; **Polizzi Generosa:** Piano della Madonna, 1692 m, 609211-6509212, 31 Oct 2004, wood of *Fagus sylvatica*.

***Tuber aestivum* Vittad.** (Fig. 30)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 01 Nov 2004, reforestation of *Pinus halepensis* and *P. pinea* with scattered plants of *Q. ilex*; **Castronuovo di Sicilia:** Riserva Monte Carcaci, 1196 m, 620133, 26 Jun 2004, mixed wood of *Q. ilex* and *Q. virgiliana*; **Cinisi:** Bosco Santo Canale, 730 m, 594422, 13 Jun 2004, 08 Jul 2004, 19 Feb 2005, wood of *Q. ilex*; **Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 14 Jun 2004, 05 Jul 2004, mixed wood of *Q. leptobalanos* and *Q. ilex*; **Isnello:** Piano Zucchi, 865 m, 609122, 29 Oct 2005, wood of *Q. ilex*; **Longi:** Crocetta, 630 m, 599323, 17 Jun 2004, mixed wood of *Q. ilex*, *Q. virgiliana*, *Osryta carpinifolia*, *Acer campestre* and *Fraxinus ornus*; **Noto:** Contrada Cardinale, 503-530 m, 645214, 15 Jun 2005, wood of *Q. ilex*; Feudo Bauli, 605 m, 645224, 16 Jun 2004, 15 Jun 2005, wood of *Q. ilex*; **Polizzi Generosa:** Pizzo Colla, 1676 m, 609211, 31 Oct 2004, wood of *Fagus sylvatica*; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 01 Jul 2004, mixed wood of *Q. ilex* and *Q. virgiliana*; **Torretta:** Mandria Zarcati, 510 m, 594113, 29 Oct 2004, 17 Jun 2005, reforestation of *Cupressus sempervirens* and *Pinus pinea*.

***Tuber borchii* Vittad.** (Fig. 31)

**Castronuovo di Sicilia:** Piano della Fieravecchia, 1078 m, 620244, 15 Apr 2004, mixed wood of *Q. ilex* and *Q. pubescens*; **Menfi:** Contrada Magaggiaro, 397 m, 618212, 15 Mar 2005, reforestation of *P. pinea*; **Monreale:** Casaboli, 750-900 m, 594242, 25 Feb 2005, reforestation of *P. pinea*; Monte Petroso (San Martino delle Scale), 663 m, 594214-594422, 19 Feb 2005, mixed wood of *Quercus ilex*, *Q. suber*, *Pinus pinea* with plants of *Erica multiflora* and *Cistus creticus*; **Sambuca di Sicilia:** Cozzo del Serro, 491 m, 619321, 26 Feb 2005, reforestation of *P. pinea*; **Santo Stefano Quisquina:** Bosco di Buonanotte, 769 m, 629141, 26 Feb 2004, reforestation of *P. halepensis* and *P. pinea* with small plants of *Q. ilex* and *Q. virgiliana* in the underwood; La Donna, 620233, 26 Feb 1998, reforestation of *P. halepensis* and *P. pinea* with small plants of *Q. ilex* and *Q. virgiliana* in the under wood; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*.

***Tuber brumale* Vittad.** (Fig. 32)

**Noto:** Feudo Bauli, 605 m, 645224, 02 Nov 2004, 15 Jun 2005, wood of *Q. ilex*.

***Tuber excavatum* Vittad.** (Fig. 33)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 26 Feb 2004, 01 Nov 2004, 17 Jun 2005, reforestation of *Pinus halepensis* and *P. pinea* with scattered plants of *Q. ilex*; **Cinisi:** Bosco Santo Canale, 730 m, 594422, 29 Oct 2004, 08 Jul 2004, wood of *Q. ilex*; **Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 05 Jul 2004, mixed wood of *Q. leptobalanos* Guss. and *Q. ilex*; **Longi:** Crocetta, 630 m, 599323, 14 Jun 2005, mixed wood of *Q. ilex*, *Q. virgiliana*, *Ostrya carpinifolia*, *Acer campestre* and *Fraxinus ornus*; **Noto:** Contrada Cardinale, 503-530 m, 645214, 15 Jun 2005, wood of *Q. ilex*; Feudo Bauli, 605 m, 645224, 15 Jun 2005, wood of *Q. ilex*; **Polizzi Generosa:** Pizzo Colla, 1676 m, 609211, 31 Oct 2004, wood of *Fagus sylvatica*; Santa Nicola, 658 m, 609221, 19 Jun 2005, scattered plants of *Q. pubescens* at the border of tilled fields; **Torretta:** Mandria Zarcati, 510 m, 594113, 29 Oct 2004, reforestation of *Cupressus sempervirens* and *Pinus pinea*.

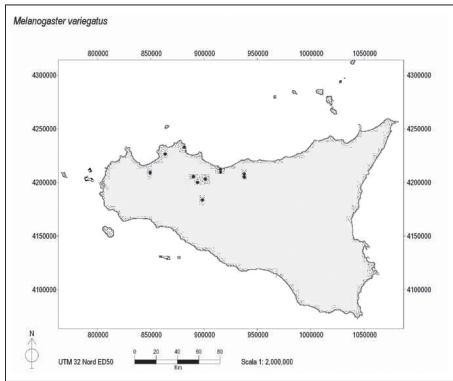


Fig. 25.

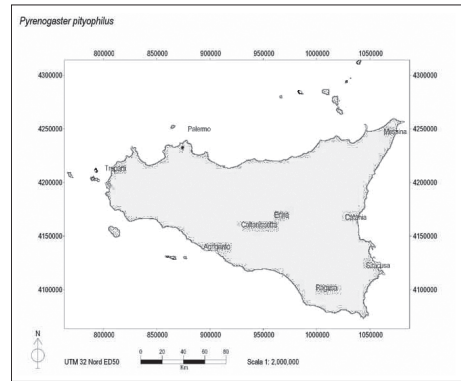


Fig. 26.

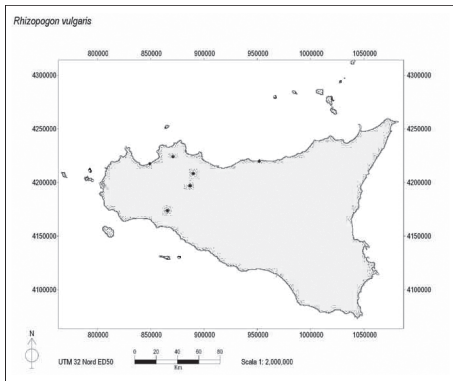


Fig. 27.

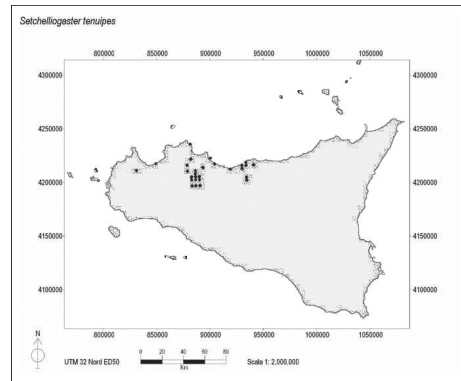


Fig. 28.

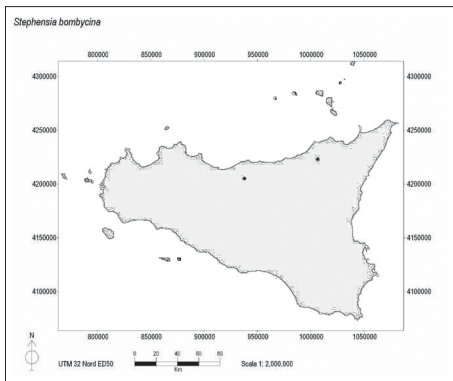


Fig. 29.

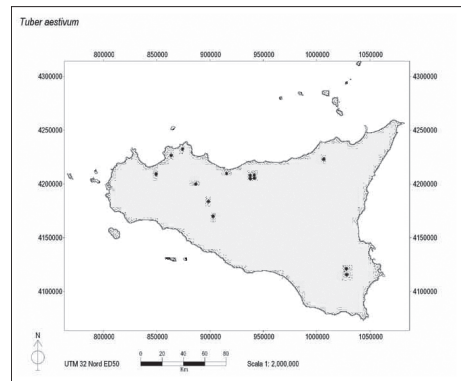


Fig. 30.

***Tuber foetidum* Vittad.** (Fig. 34)

**Nota:** Feudo Bauli, 605 m, 645224, 16 Jun 2005, 15 Jun 2005, wood of *Q. ilex*; **Santo Stefano Quisquina:** Serra Quisquina, 1094 m, 620233, 14 Apr 2004, reafforestation of *C. atlantica* and *P. nigra*.

***Tuber oligospermum* (Tul. & C. Tul.) Trappe** (Fig. 35)

**Carini:** Piano di Santa Venere, 592 m, 594422, 19 Feb 2005, reafforestation of *E. camaldulensis*.

***Tuber panniferum* Tul. & C. Tul.** (Fig. 36)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 17 Jun 2005, reafforestation of *Pinus halepensis* and *P. pinea* with scattered plants of *Q. ilex*; **Cinisi:** Bosco Santo Canale, 730 m, 594422, 08 Jul 2004, wood of *Q. ilex*; **Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 05 Jul 2004, mixed wood of *Q. leptobalanos* and *Q. ilex*; **Longi:** Crocetta, 630 m, 599323, 14 Jun 2005, mixed wood of *Q. ilex*, *Q. virgiliana*, *Ostrya carpinifolia*, *Acer campestre* and *Fraxinus ornus*; **Nota:** Contrada Cardinale, 503-530 m, 645214, 15 Jun 2005, wood of *Q. ilex*; Feudo Bauli, 605 m, 645224, 16 Jun 2004, 02 Nov 2004, 15 Jun 2005, wood of *Q. ilex*.

***Tuber puberulum* Berk. & Br.** (Fig. 37)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 17 Jan 2005, reafforestation of *Pinus halepensis* and *P. pinea* with scattered plants of *Q. ilex*; **Carini:** Piano di Santa Venere, 592 m, 594422, 13 Apr 2004, 19 Feb 2005, reafforestation of *E. camaldulensis*; **Longi:** Crocetta, 630 m, 599323, 14 Jun 2005, mixed wood of *Q. ilex*, *Q. virgiliana*, *Ostrya carpinifolia*, *Acer campestre* and *Fraxinus ornus*; **Menfi:** Contrada Magaggiaro, 397 m, 618212, 15 Mar 2005 reafforestation of *P. pinea*; **Monreale:** Monte Petroso (San Martino delle Scale), 663 m, 594214-594422, 19 Feb 2005, mixed wood of *Quercus ilex*, *Q. suber*, *Pinus pinea* with *Erica multiflora* and *Cistus creticus*; **Sambuca di Sicilia:** Cozzo del Serro, 491 m, 619321, 26 Feb 2005, reafforestation of *P. pinea*; **Santo Stefano Quisquina:** Bosco di Buonanotte, 769 m, 629141, 15 Apr 2004, reafforestation of *P. halepensis* and *P. pinea* with small plants of *Q. ilex* and *Q. virgiliana*; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 14 Apr 2004, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*.

***Tuber rufum* Pico : Fr.** (Fig. 38)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 01 Nov 2004, 17 Jun 2005, reafforestation of *Pinus halepensis* and *P. pinea* with small plants of *Q. ilex*; **Carini:** Piano di Santa Venere, 592 m, 594422, 13 Apr 2004, 19 Feb 2005, 17 Jun 2005, reafforestation of *E. camaldulensis*; **Cinisi:** Bosco Santo Canale, 730 m, 594422, 08 Jul 2004, wood of *Q. ilex*; **Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 11 Jan 2004, 05 Jul 2004, 30 Oct 2004, mixed wood of *Q. leptobalanos* and *Q. ilex*; **Isnello:** Bevaio del Faggio, 1355 m, 609211-610344, 29 Oct 2005, in the glades of beech wood reafforested with plants of *C. atlantica* and *P. nigra*; Piano Zucchi, 865 m, 609122, 29 Oct 2005, wood of *Q. ilex*; **Longi:** Crocetta, 630 m, 599323, 14 Jun 2005, mixed wood of *Q. ilex*, *Q. virgiliana*, *Ostrya carpinifolia*, *Acer campestre* and *Fraxinus ornus*; **Monreale:** Monte Petroso (San Martino delle Scale), 663 m, 594214-594422, 18 Jun 2005, mixed wood of *Quercus ilex*, *Q. suber*, *Pinus pinea* with *Erica multiflora* and *Cistus creticus* in the underwood; **Nota:** Contrada Cardinale, 503-530 m, 645214, 15 Jun 2005, wood of *Q. ilex*; Feudo Bauli, 605 m, 645224, 15 Jun 2005, wood of *Q. ilex*; **Palermo:** Bosco di Niscemi (Parco della Favorita), 43-48 m, 595443 22 Feb 2005, wood of *Q. ilex*; **Polizzi Generosa:** Pizzo Colla, 1676 m, 609211, 31 Oct 2004, wood of *Fagus sylvatica*; **Sambuca di Sicilia:** Cozzo del Serro, 491 m, 619321, 26 Feb 2005, reafforestation of *P. pinea*; **Termini Imerese:** Monte San Calogero, 690 m, 609431, 01 Jul 2004, 22 Feb 2005, mixed wood of *Q. ilex* and *Q. virgiliana*; **Torretta:** Mandria Zarcati, 510 m, 594113, 29 Oct 2004, 03 Jul 2004, 19 Feb 2005, 17 Jun 2005, reafforestation of *C. sempervirens* and *P. pinea*.

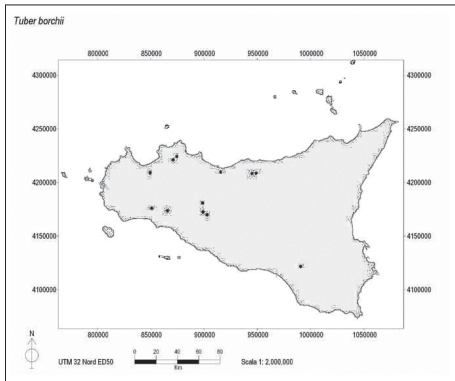


Fig. 31.

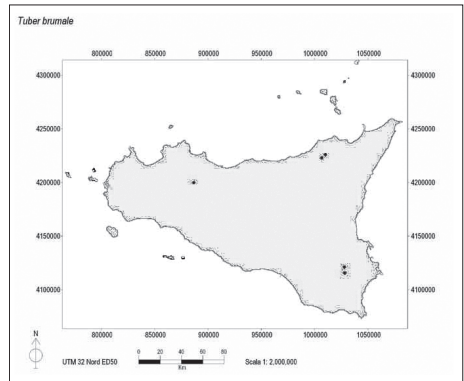


Fig. 32.

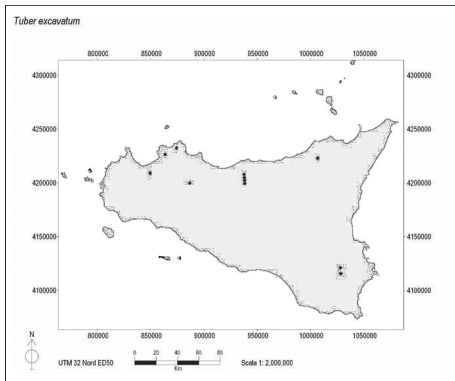


Fig. 33.

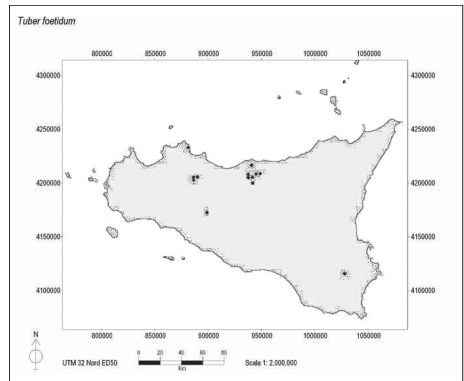


Fig. 34.

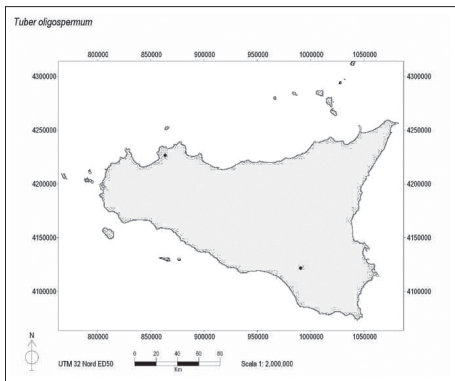


Fig. 35.

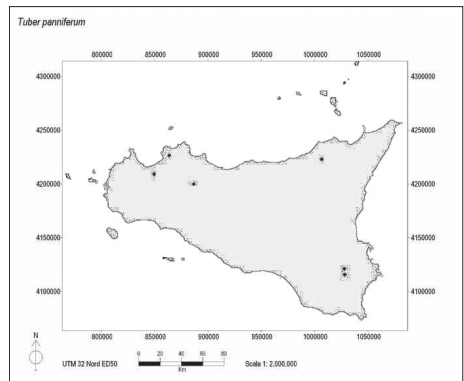


Fig. 36.

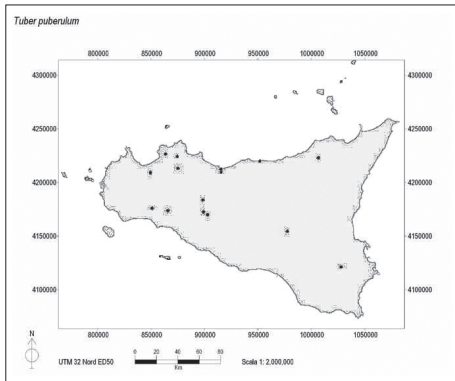


Fig. 37.

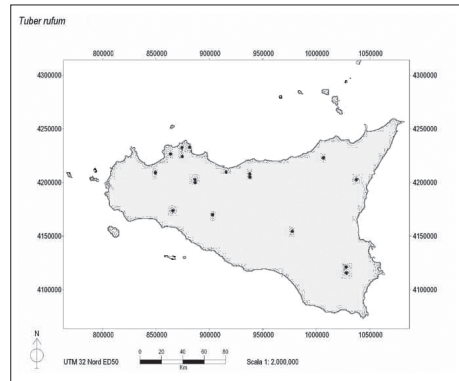


Fig. 38.

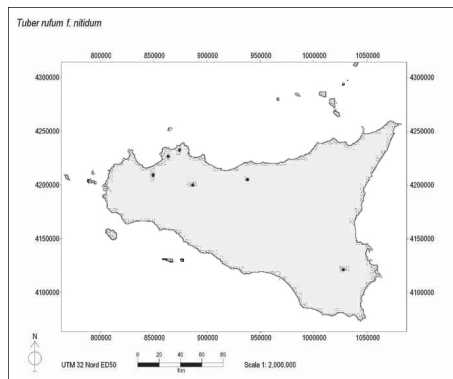


Fig. 39.

***Tuber rufum* f. *nitidum* (Vittad.) Montecchi & Lazzari** (Photo 9, Fig. 39)

**Alcamo:** Monte Bonifato (Bosco d'Alcamo), 730 m, 606112, 01 Nov 2004, reafforestation of *P. halepensis* and *P. pinea* with scattered small plants of *Q. ilex*; **Cinisi:** Bosco Santo Canale, 730 m, 594422, 29 Oct 2004, wood of *Q. ilex*; **Godrano:** Cima Cucco (Bosco della Ficuzza), 981 m, 608342, 05 Jul 2004, mixed wood of *Q. leptobalanus* and *Q. ilex*; **Noto:** Contrada Cardinale, 503-530 m, 645214, 15 Jun 2005, wood of *Q. ilex*; **Polizzi Generosa:** Pizzo Colla, 1676 m, 609211, 31 Oct 2004, wood of *Fagus sylvatica*; **Torretta:** Mandria Zarcati, 510 m, 594113, 14 Apr 2004, reafforestation of *C. sempervirens* and *P. pinea*.

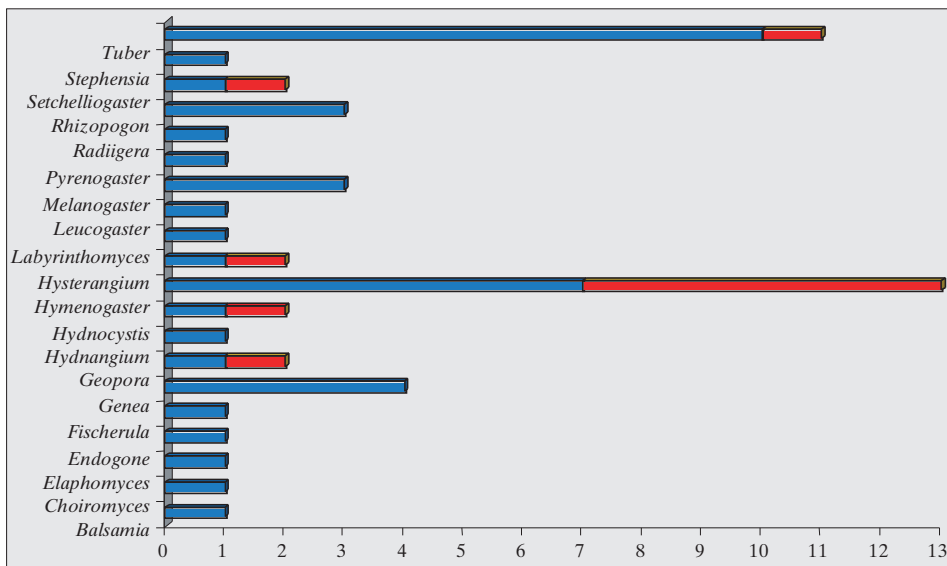


Fig. 40. Number of hypogeous taxa per genus recorded in Sicily. The increase in the number of taxa respect to the publication of Venturella et al. (2004) is displayed in red ink.

## DISCUSSION

Thirty-nine hypogeous and semi-hypogeous fungi, twenty *Ascomycetes* and nineteen *Basidiomycetes*, were collected from February 2004 to December 2005 in Sicily.

One genus, *Fischerula* Mattir. and ten taxa (*Fischerula macrospora*, *Geopora cooperi*, *Hydnocystis clausa*, *Hymenogaster bulliardii*, *H. calosporus*, *H. decorus*, *H. griseus*, *Leucogaster nudus*, *Stephensia bombycina* and *T. rufum* f. *nitidum*) are new records from Sicily.

*Fischerula macrospora* is a very interesting species previously recorded in Italy from Tuscany (Mattiolo, 1928), Lazio (Mattiolo, 1933), Lombardia (Mattiolo, 1935), Emilia Romagna (Montecchi & Lazzari, 1988, Montecchi & Lazzari, 1993) and reported by authors as symbiont of *Corylus avellana* L. and *Fagus sylvatica* L. During our field investigation this species was collected for the first time in Sicily in two different localities: a) Cima Cucco in the natural reserve of Bosco della Ficuzza-Rocca Busambra (province of Palermo) in a mixed wood of *Q. ilex* L. and *Q. virgiliana*. and b) Bosco Santo Canale (province of Palermo) in a *Q. ilex* wood.

In Sicily the presence of *Hymenogaster citrinus* and *H. muticus*, previously reported by Mattiolo (1900) from two localities of the provinces of Palermo and Agrigento, was confirmed. In particular three new localities of finding belonging to the provinces of Palermo and Trapani are reported in this paper.



Besides, according to recent investigation, a huge number of new localities were added to species quoted in the publication of Venturella et al. (2004). These data compared with the new findings were used to obtain maps of distribution of each recorded species in Sicily.

According to literature data and field investigation the number of hypogeous and semi-hypogeous fungi currently known from Sicily is sixty-five (63 species, 1 variety and 1 form). The most represented genera are *Hymenogaster* Vittad. (13 taxa) and *Tuber* F. H. Wigg. (11 taxa) followed by *Genea* Vittad. (4 taxa), *Melanogaster* Corda (3 taxa) and *Rhizopogon* Fr. & Nordholm (3 taxa) (Fig. 40).

The morphological characters of the ascomata collected in Sicily compared with literature data emphasized the necessity to clarify the controversial taxonomic position of the truffles belonging to the “*T. puberulum* group” (Halász et al., 2005). Moreover the molecular data kept in GenBank database are confused (<http://www.ncbi.nlm.nih.gov/BLAST/>) and often unreliable (Bridge et al., 2003).

The first collection of *Tuber aestivum* in a *Pinus pinea* reforestation, in the locality of Mandria Zarcati (municipality of Torretta, province of Palermo) is noteworthy and widens the number of host plants for inoculations to be used in the cultivation of seedlings.

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