

First record of *Trichoglossum tetrasporum* Sinden & Fitzp. (Helotiales, Geoglossaceae) from Italy

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Abstract

The first record of *Trichoglossum tetrasporum* from Italy is here reported. The work reports macro- and microscopic descriptions of the taxa and remarks on its distribution also in comparison with some related species.

Keywords: *Geoglossaceae*, *Trichoglossum tetrasporum*, taxonomy, Italy

Introduction

In the frame of researches devoted to the knowledge of Ascomycetes in Sicily, a rare species belonging to the family of Geoglossaceae and called *Trichoglossum tetrasporum* Sinden & Fitzp was collected in “Complesso Speleologico Villasmundo – S. Alfio”, an extensive nature reserve of remarkable naturalistic interest, placed in Melilli region (Syracuse) and already object of a previous investigation (Lantieri 2004).

T. tetrasporum was described for the first time by Sinden and Fitzpatrick (1930) from America; only a few following reports are known, from Great Britain (Nannfeldt 1942), The Netherlands (Maas-Geesteranus 1964), Denmark (Benkert 1976), and Spain (Gálan & Rubio 1998); its finding in Sicily, besides being the first record from Italy, increases the knowledge about its distribution in the Mediterranean area.

Materials and methods

Morphologic and microscopic observations were carried out on fresh ascomata. Microscopic analyses were carried out using water and optic instrument with 40 × or 100 × (oil immersion) objectives. The sporal size was obtained from the measurement of 50 spores, considering only the most mature specimens

of the various collections. Herbarium specimens were kept in the Herbarium of the Royal Botanic Gardens of Kew [K(M)].

Results

T. tetrasporum Sinden & Fitzp., Mycologia 22 (2): 60 (1930). Description: Ascoma (Figure 1) up to 50 mm high, more or less regularly clavate, elongate, tongue-shaped, fusiform, with rounded or obtuse apex, irregularly flattened or compressed, sometimes slightly curved, 3–5 mm wide and up to 10 mm long. Hymenium velvety, black or blackish, sometimes wrinkled. Stalk cylindrical in the middle, 1.5–2 mm diameter, dilated up to 3 mm near the ascigerous portion and the base, generally sinuous or curved, up to 40 mm long; surface velvety, but smooth at the base, concoloured with the hymenium. Flesh tough, blackish, horny when dried. Spores (Figure 2) narrowly fusiform or bacilliform, 140–150 × 5–6 μm, smooth, brown, straight or slightly curved, with 15 transversal septa when completely developed (less if immature), parallelly arranged in the upper part of the ascus; each single cell delimited by two septa is often uniguttulate, and the oil-drop appears as almost large as the cell. Asci clavate, 230–250 × (21) 24–27 μm, four-spored when completely ripe, amyloid, inoperculate. Paraphyses sub-cylindrical toward the bottom, but often with some swollen



Figure 1. *T. tetrasporum*: Ascomata in habitat (bar = 10 mm).

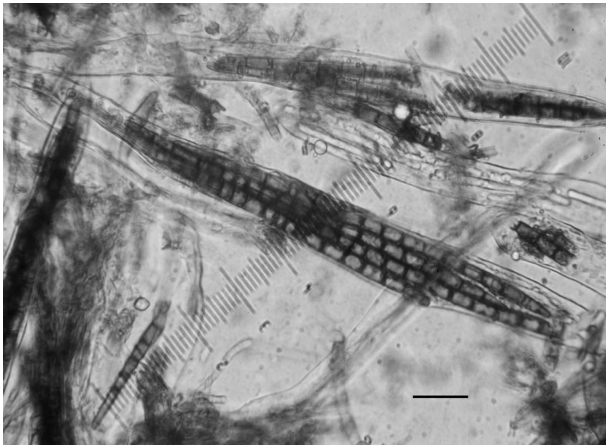


Figure 2. *T. tetrasporum*: Micrograph in water. Ascus 4-spored (bar = 100 μm).

cells underneath the apex, on average 5–6 μm wide (swollen cells up to 10 μm), hooked, curled, crosier-shaped or bent at the apex, septate, brown (particularly in the upper part), few longer than the asci. Setae lengthily fusiform, straight, few of them bluntly bent near the base, with irregularly waved outline, not rarely enlarged in some points, sometimes ventricose, sometimes frankly tapered toward the top and the base, (210) 250–280 \times 6–8 μm , but up to 10 μm wide on the swellings, pointed, thick-walled (up to 3 μm), without septa, smooth, blackish-brown. Medullary excipulum of textura intricata, made up by 3–5 μm diameter, interwoven, brown hyphae, with some septa. Ectal excipulum of parallel textura, with 3–4 μm wide, parallel, straight, septate, brown, hyphae. Pigments brown.

Habitat: in groups of few individuals, on mosses.

Specimens examined: Italy: Melilli (Syracuse), Natural Reserve “Complesso Speleologico Villasmundo – S. Alfio”, 15. III. 2007, Lantieri K(M) 160890.

Discussion

The genus *Trichoglossum* Boud., described for the first time by Boudier (1885), includes species morphologically similar to those of the genus *Geoglossum* Pers., but having more or less thin, pointed, dark setae on the hymenial surface and on the stalk.

In accordance with Durand (1908), the differentiation among the several species previously described within the genus is possible by some distinctive characters, such as the length and the amount of spores in the asci, and their number of septa.

According to our experience based on the observations carried out on material of *T. tetrasporum* and *T. hirsutum* (Fr.) Boud. [K(M) 160891] (the only entities recorded in Sicily until now), a further separation could arise also after a better examination of the size and the conformation of the setae, that although peculiar in the definition of the genus, are usually scarcely illustrated or unmentioned in the description of the various taxa.

It has been indeed noted that even if similar, setae have some significant differences; in *T. hirsutum*, in several characters closely related to *T. tetrasporum* but more common, they are shorter (150–225 (235) \times 5–6 μm), mainly curved (only a few are straight), without sudden thinning or swelling, and paler toward the base. Even if both of them have 15-septate spores, *T. tetrasporum* differs also in having four-spored asci when completely mature.

After evaluation and comparison of the data obtained by the study of our *T. tetrasporum* specimens in respect to the literature, it has been noted that referring to the holotype of Sinden and Fitzpatrick (1930) (re-examined by Mains (1954)), and to the description by Seaver (1928) (entirely tracing the original one), our specimens were different only for the slightly longer and larger asci, as it results in the comparison of the data reported in Table I.

Data concerning length and shape of the setae are usually omitted by many authors except Maas-Geesteranus (1964) and Gálan and Rubio (1998) who report some information on their size. In comparison with the smaller length observed by Maas-Geesteranus (1964) ((l.c.) 40 μm), and to the unique datum of Gálan and Rubio (1998) ((l.c.) 135 μm), our specimens showed longer setae. This probably marks the variability of this character, together with the number of the spores contained in the asci.

Sinden and Fitzpatrick (1930) reported asci at first eight-spored; Mains (1954), during the re-examination of the holotype, described asci seldom with less than four spores (these ones not mentioned by Sinden and Fitzpatrick (1930) (l.c.)),

Table I. Comparison among the morphologic characters of *T. tetrasporum* of the examined collection based on data of the literature.

	Ascomata size (mm)	Spores (μm)	Asci (μm)	Setae (μm)
Sicilian specimens, K(M) 160890	Total length 50, Clavula 10	140–150 \times 5–6, 15 septa	230–250 \times (21) 24–27, 4-spored, but more if immature	(210) 250–280 \times 6–8 (10)
Sinden and Fitzpatrick 1930 (holotype)	Total length 30–80, Clavula 1/5 of the length (6–16 mm, N.d.A.)	110–160 \times 6–7, 15 septa	175–220 \times 20–25, 4-spored	Not described
Mains 1954 (re-examination of the holotype 1930)	Total length 30–80, Clavula 1/5 of the length (6–16 mm, N.d.A.)	(110) 125–145 (150) \times 6–7, 0–17 septa (the most part with 15)	175–200 \times 20–25, 4-spored, occasionally less	Not described
Seaver 1928	Total length 30–80, Clavula 1/5 of the length (6–16 mm, N.d.A.)	110–160 \times 6–7, 15 septa	175–220 \times 20–25, 4-spored	Not described
Maas-Geesteranus 1964	Total length 17, Clavula 5–10	112–146 \times 6 With 16 cells (15 septa)	190–205 \times 16–18, 4-spored	40–225 \times 4–10
Ellis and Ellis 1988	Total length 100, Clavula 10–20	120–160 \times 6–7, 15 septa	Not described	Not described
Gálan and Rubio 1998	Total length 25, Clavula 6–8	134–160 \times 6–6.5, 15 septa, occasionally less	225 \times 22, initially 8-spored, then 4-spored, exceptionally with 2–3 spores	135 \times 7
Ahti et al. 2000	Clavula not more than 1/5 of the total length (total length not described)	105–140 \times 5, 15 septa	Not described	Not described

Table II. Comparison among *T. tetrasporum* and related species.

	<i>T. tetrasporum</i> (Sicilian specimens K(M) 160890)	<i>T. tetrasporum</i> var. <i>brevisporum</i> (Tai 1944)	<i>T. tetrasporum</i> var. <i>yunnanense</i> (Mains 1954)	<i>T. hirsutum</i> (sicilian specimens K(M) 160891)	<i>T. velutipes</i> (Tai 1944)
Spores size (μm)	140–150 \times 5–6	117–136 \times 6–7	(125) 140–190 \times 6–7	120–135 \times 5–6	106–154 \times 5.5–6.5
Type of asci	4-spored	4-spored	4-spored	8-spored	4-spored
Asci size (μm)	230–250 \times (21) 24–27	206–219 \times 19–24	200–290 \times 19–22	180–220 \times 20–24	188–224 \times 17–22
N. of septa	15	15	15	15	8–11
Setae size (μm)	(210) 250–280 \times 6–8	274–289	Not described	150–225 (235) \times 5–6	117–157 \times 6–7

but did not report asci with more than four spores. Finally, Gálan and Rubio (1998) noted asci initially eight-spored too, but also some exceptions with 2–3 spores. Similar variability, even if with some differences in respect of what reported in literature, has been observed also in the Italian specimens of *T. tetrasporum*.

In a not completely mature ascomata of the studied collection it has been indeed noted both the presence of typical four-spored asci (containing dark brown, rightly sized spores) and asci with 5–6–8 paler brown or brownish-yellow spores (seven-spored asci have not been observed), only 90–120 μm long, not completely developed.

The presence in young ascocarps of asci with more than four spores not completing their development

corroborates the assertion of Sinden and Fitzpatrick (1930) (l.c.): “... That it arose from this species or from a common ancestor with eight-spored asci is suggested by the fact that in it the young ascus contains the fundamentals of 8 spores. Four of these develop into spores. The other four elongate somewhat, but appear finally as no more than indistinct protoplasmic strands ...”.

The opinion is that the presence of asci with more than four spores is limited to the initial or intermediate phases of development, whilst when the fungus is completely ripe, the spores become four in each ascus, as we noted in all the ripe strains. Asci with less than four spores were not even observed.

Two varieties of *T. tetrasporum* have been also identified from Yunnan (China): var. *brevisporum* F.L. by Tai (1944) differs in having smaller spores,

and var. *yunnanense* (F.L. Tai) Mains by Mains (1954), on the contrary, in longer ones. Moreover the above-mentioned characters allow differentiating *T. tetrasporum* also from other similar entities (Table II) such as *Trichoglossum hirsutum* (already compared), and *Trichoglossum velutipes* (Peck) E.J. Durand, until now collected only in America (Mains 1954) and in China (Tai 1944); this latter with four-spored asci but with 8–11 septate spores, on average shorter.

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