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Agaricus bitorquis (Quél.) Sacc. (Agaricaceae), a new record for the island of Porto Santo (Madeira, Portugal)

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With 2 figures

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ABSTRACT: Porto Santo is a small volcanic island that belongs to the Portuguese archipelago of Madeira and is located in central East-Atlantic. The mycobiota of this island comprises 19 species of fungi. With the present work, a new record is added to the checklist of fungi from the archipelago of Madeira, *Agaricus bitorquis* (Quél.) Sacc.

Key words: Agaricales, new record, Porto Santo.

RESUMO: O Porto Santo é uma pequena ilha vulcânica que pertence ao arquipélago da Madeira e localiza-se no Atlântico. A micobiota desta ilha compreende 19 espécies de fungos. Com o presente trabalho, um novo registo é adicionado à listagem dos fungos do arquipélago da Madeira, *Agaricus bitorquis* (Quél.) Sacc.

Palavras-chave: Agaricales, novo assinalamento, Porto Santo.

INTRODUCTION

Porto Santo is a volcanic island that belongs to the Portuguese archipelago of Madeira and is located in central East-Atlantic, approximately 700 km off NW-Africa (SCHMIDT & SCHMINCKE, 2002). It is a small island (42,2 km²) extending between 32° 59' and 33° 07' N and 16° 16' and 16° 24' W. Together with the archipelagos of Madeira, Selvagens, Azores, Canary Islands and Cape Verde, is part of the Macaronesia biogeographical region (SHANDILYA, 2017).

In contrast with the abrupt sea cliffs of the northern coast of Porto Santo, the southern coast presents an extensive 9 km beach, mainly formed by calcareous sand that resulted from the fragmentation of shells, corals and calcareous algae, giving it its characteristic yellow colour. The sands result from erosive processes associated with rain and surface runoff towards the south coast of the island, which are responsible for transporting the sand from the calcareous sandstones, located in the central west region, of the island to the beach (FERREIRA, 2014).

According to SHANDILYA (2017), the island of Porto Santo has temperate oceanic semi-arid climate, deeply influenced by its location, relief, dimension, altitude and the dominant northeastern trade wind system.

The island has a low annual rainfall, usually less than (300-) 400 mm and a mean annual temperature of 18 °C (JARDIM & MENEZES DE SEQUEIRA, 2014). November and December are the wettest month while it rains very little during summer months (SHANDILYA, 2017).

The mycoflora of the island of Porto Santo, according to MELO & CARDOSO (2008) comprises 14 species of fungi. Since then, five new additions to Porto Santo's mycoflora, were published (CALONGE & MENEZES DE SEQUEIRA, 2003, 2007, 2011 a, b, c, 2014; CALONGE *et al.*, 2008 a, b, 2009, 2010, 2012, 2013; Iglesias *et al.*, 2014; FERNÁNDEZ-VICENTE *et al.*, 2016). Thus, this collection represents the twentieth species found for the island of Porto Santo.

A. bitorquis (Quél.) Sacc. does not occur in the other archipelagos of Macaronesia (BAÑARES BAUDET, 2005; BELTRÁN TEJERA, 2010; MELO *et al.*, 2010).

MATERIAL AND METHODS

The specimens of *Agaricus bitorquis* are deposited in the fungi collection of the Natural History Museum of Funchal (MMF) and, a duplicate, in the Moravian Museum (BRNM). Microscopic characters were observed on dried material mounted in water and Congo Red using an

Olympus BX-50 light microscope with a magnification of 400x and 1000x. Microscopic description is based on 30 measurements of basidiospores, basidia, cheilocystidia and pileipellis elements.

RESULTS

Fungi

Basidiomycota, Agaricomycotina,
Agaricomycetes, Agaricomycetidae, Agaricales,
Agaricaceae, Agaricus,
Agaricus bitorquis
(Quél.) Sacc., Syll. fung. (Abellini) 5: 998 (1887).

STUDIED MATERIAL

Portugal, Porto Santo:

On sandy substrate, Campo de Baixo, 17. XII. 2021, Juan Silva *leg.*, Hana Ševčíková *det.*, 33° 02.371 'N 16° 21.583 'W, 2 m *a.s.l.* (MMF 49145; BRNM 829058).

DESCRIPTION

Pileus – 40-95 mm in diameter, plano-convex to applanate with a shallow to distinct depression in the centre. Pileus surface smooth, whitish. Margin of the pileus in some basidiomata indistinctly involute, without striation.

Lamellae – free, crowded, brown with pink tinge or reddish brown, then chocolate brown.

Stipe – 30-55 x 10-20 mm, cylindrical to narrowly clavate, slightly thickened to indistinctly bulbous near the base, smooth, white.

Annulus – white, double, the lower thin, resembling a volva.

Context – firm, white at first, later turning pale greyish-brown.

Taste – mushroomy, smell pleasant.

Spores – (4.2-)5.0-6.5(-7) x (4-)4.5-5(-5.5) µm, broadly ellipsoid to subglobose, thick-walled.

Basidia – 20-25 x 6-10 µm, tetrasporic or bisporic, cylindrical to clavate, with sterigmata up to 3.5 µm.

Cheilocystidia – common, with or without 1-3 septa at the base, thin-walled to slightly thick-walled, mostly clavate.

Pileipellis – cutis made of cylindrical hyphae 3-10 µm wide.



Fig. 1 – *Agaricus bitorquis* (Quél.) Sacc.: general aspect.



Fig. 2 – *Agaricus bitorquis* (Quél.) Sacc.: close-up of the context and lamellae.

DISCUSSION

The indigenous forest of the island of Porto Santo was irrevocably devastated in the centuries that followed the arrival of the first settlers (CAMPINHO, 2021). Potentially, the native olive tree forest (*zambujal*) and the Mediterranean laurel forest of the Canary laurel would cover this island.

Regarding land use on the island of Porto Santo, according to the second forest inventory of the Autonomous Region of Madeira (DIREÇÃO REGIONAL DAS FLORESTAS, 2015), 60% of the island's area (2,566 ha) is occupied by bushes and herbs, 12% by urbanized area (505 ha), 8% by cultivated forest (362 ha) and 6% by agricultural fields (240 ha).

The geological characteristics of the island of Porto Santo, its orography, size, the poor and arid soil (sandy-clay), the reduced average annual precipitation, the exposure of the island to wind, sea air and the sun may justify the low mycological diversity of this island. *Agaricus bitorquis* is a resilient species that can cope with these adverse conditions.

Agaricus bitorquis is a widespread and common species all over Europe, frequent on coastal dunes (PARRA-SÁNCHEZ, 2008) and also in localities strongly influenced by humans – parks, gardens, paths. This species can even break through older asphalt roads. *Agaricus bitorquis* is an edible species collected for cooking in Central and East Europe, only taste of very old basidiomata can be disagreeable (CAPELLI, 1984). This species can be confused by non-specialists with toxic *Agaricus xanthodermus* Genev., a fungus present on the island of Madeira and Porto Santo (CALONGE & MENEZES DE SEQUEIRA, 2011b) and some similar species from *A. xanthodermus* group. This species is conspicuous by intensely and quickly chrome-yellowing basidiomata, especially at the base of the stipe and has an unpleasant smell of iodine, phenol, etc. (CAPELLI, 1984; CALONGE & MENEZES DE SEQUEIRA, 2011b). Somewhat similar edible species *Agaricus arvensis* also grows on the island of Madeira (CALONGE & MENEZES DE SEQUEIRA, 2011b), but significantly differs by anise smell and context which turns yellow when cut.


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