

## Notes on xanthoid form of *Boletus satanas* (Basidiomycota, Boletaceae): taxonomic status of *Boletus crataegi* Smotl.

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ANTONÍN V. & JANDA V. 2007: Notes on xanthoid form of *Boletus satanas* (Basidiomycota, Boletaceae): taxonomic status of *Boletus crataegi* Smotl. *Acta Musei Moraviae, Scientiae biologicae* (Brno) 92: 211–215. – The taxon known as *Boletus crataegi* Smotl., an invalidly published name, is discussed. On the basis of their studies, the authors consider it only a xanthoid form of *Boletus satanas*, here described as *B. satanas* f. *crataegi* (Smotl.) ex Antonín et V. Janda f. nov. Macro- and microscopic descriptions based on new collections from the vicinity of Mokrý-Horákov (Czech Republic, Moravia) are given.

**Key words.** Basidiomycetes, Boletaceae, *Boletus crataegi*, xanthoid form, Czech Republic, Moravia

### Introduction

In the course of mycological research into an oak forest known as Sivický les, close to the village of Mokrý-Horákov (Moravia, Czech Republic), a very interesting bolete was found. In shape, size and most of its other characters, it conformed to the description of *Boletus satanas* Lenz; however, its pileus was very pale, the stipe lacked a reddish tinge and the pores were coloured from yellow to red in different basidiocarps, forming a complete series of transient forms. These characters agree well with a taxon known in our country as *Boletus crataegi* Smotl., an invalidly published name

The microscopic features are described from material mounted in Melzer's reagent, Congo Red, and KOH. For the size of basidiospores the following factors are used: X (mean of length and width of all basidiospores measured), E (quotient of length and width in any one basidiospore) and Q (mean of E-values). Authors of fungal names are cited after KIRK & ANSELL (1992), colour abbreviations after KORNERUP & WANSCHER (1983) and herbarium abbreviation follows HOLMGREN (2003).

### Results and discussion

The name *Boletus crataegi* was first published, invalidly, by SMOTLACHA (1935: 70) without a description (ICBN Art. 36.1) but with an indirect reference to his description of *B. aestivalis* sensu Smotl. 1911. Smotlacha included *B. crataegi* in sect. *Duri* together with *B. appendiculatus* Schaeff., *B. aereus* sensu Krombh., *B. aestivalis* sensu Kallenb., *B. regius* Krombh. and *B. fuscoroseus* Smotl. with a note that it tends to be grouped among the bluing species because its context changes colour distinctly when injured. In an older monograph, he called it *B. aestivalis* (SMOTLACHA 1911: 51) describing it as

having a whitish-yellow pileus, yellow tubes and a sulphur yellow context changing colour to blue when injured, and he placed it in his group *Luridi*. Later, SMOTLACHA (1947: 189–190) published a brief description (in Czech) of his *B. crataegi*, and characterised this taxon as a fungus close to *B. satanas* (including its unpleasant smell) but with lemon-yellow tubes, and pores and stipe changing colour to blue on cutting. He even considered *B. fechtneri* Velen. a rare form of it at the same time. In a third reference to this fungus, SMOTLACHA (1952: 32) mentioned that *B. crataegi* (synonymising it with *Boletus aestivalis* sensu Smotl) is closely related to *B. satanas* but differs in having a different tube and stipe colour. These further Smotlacha publications of the name *B. crataegi* are also rendered invalid by the absence of a Latin diagnosis or description (ICBN Art. 36.1).

Ten years ago, HLAVÁČEK (1998: 6) published a description of *Boletus crataegi* Smotl. ex Hlaváček; this was also, however, invalid. Although he published a Latin diagnosis, he failed to mention the type locality (ICBN Art. 37.1). Moreover, he stated that the type specimen (which he called the neotype) is preserved in the herbarium of the Czech Mycological Society in Prague, but this material has probably never been deposited there or is not available (lost or destroyed).

On the basis of studies of recent Moravian collections, the present authors consider this taxon only a xanthoid form of *Boletus satanas* Lenz. In the absence of red pigmentation, the basidiocarps of xanthoids are yellow or yellowish. At the locality mentioned above, a large number of basidiocarps at all stages were found several times in August 2006. All of them lacked red pigmentation on pileus and stipe surface, except for a light red zone near the stipe base (reminiscent of that on the stipe of *Boletus fechtneri*). The pileus is usually whitish-yellow or greyish-yellow and the stipe yellow to ochraceous yellow. However, we found a whole transition in pore colour from pure yellow to red; the pores of some basidiocarps were even partly red and partly yellow. Another difference from the typical form is the more distinct bluing of the context. Our conclusions are in accordance with those of HLAVÁČEK (1998); however, he followed Smotlacha in considering it a good species. In contrast, GALLI (1998: 214) published a photograph of this taxon with a note that it represents a xanthoid form of *Boletus satanas*.

Regarding the facts mentioned above, we have decided to describe this taxon as a new form.

***Boletus satanas* Lenz f. *crataegi* Smotl. ex Antonín et V. Janda f. nov.**

(Photos 1–3)

*A forma typica pileo et stipite sine colore rubro, poris colore cum luteo vel aurantiaco-rubro differt.*

**Holotypus** (hic designatus): Čechia, Moravia, Mokrý háud procul Brno, Sivický les, 22. VIII. 2006 leg. A. Vágner (holotypus in herbario BRNM 705237 preservatur).

**Synonyms.** *Boletus crataegi* Smotl., Přehled Hub: 70. 1935 (invalid publication, ICBN Art. 36.1); *Boletus crataegi* Smotl., Atlas hub jedlých a nejedlých: 189. 1947 (invalid publication, ICBN Art. 36.1); *Boletus*

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*crataegi* Smotl., Mykologický Sborník 29: 32. 1952 (invalid publication, ICBN Art. 36.1); *Boletus crataegi* Smotl. ex Hlaváček, Mykol. Sborn. 75: 6. 1998 (invalid publication, ICBN Art. 37.1).

**Misapplied name.** *Boletus aestivalis* sensu Smotlacha (1911: 51).

**Iconography.** GALLI, Boleti: p. 214. 1998 (as *Boletus satanas*, a xanthoid form); HLAVÁČEK, Mykol. Sborn. 75: title page and page after p. 24. 1998 (as *Boletus crataegi*).

**Descriptions in literature.** HLAVÁČEK, Mykol. Sborn. 75: 3–7. 1998 (as *Boletus crataegi*, in Czech and Latin).

**Description** (based on personal collections and HLAVÁČEK 1998).

Pileus up to 170(–200) mm broad, irregularly hemispherical with inflexed margin and hard when young, then convex, thick-fleshy, becoming soft, slightly tomentose, then glabrescent, slightly sticky in wet conditions, whitish, whitish grey, yellowish grey, or greyish ochraceous, without red tinge or stains. Tubes rather short (up to 15 mm deep), yellow, then greyish yellow-greenish, bluing on cutting, with small, roundish, yellow to orange-red pores bluing on touch. Stipe up to 200×80 mm, barrel-shaped to ventricose when young, then usually clavate or subcylindrical with usually slightly broadened base; firm, pale yellow, pale sulphur yellow, or pale ochraceous, sometimes with a reddish belt or reddish spots near the base, slightly bluing on touch; covered with concolorous net with meshes that are small, roundish at apex and elongate in the middle part. Context fleshy, firm, whitish or pale yellowish, with pinkish or reddish tinge in stipe base, slightly bluing on cutting, later discolouring; smell fungoid when fresh and unpleasant when old or drying out, taste pleasant, almost hazelnut-like. Spore print yellowish brown.

Basidiospores (9.0–)11–13.5(–15)×(5.0–)5.5–6.5 μm, X = 12.9×6.0 μm, E = 1.9–2.4, Q = 2.2, of boletoid shape, fusoid-ellipsoid in plan view, with suprahilar depression in profile, smooth, with walls about 0.5 μm thick, brownish yellowish in KOH. Basidia 28–39×10–14 μm, usually 4-, rarely 2-spored, clavate, sometimes subcapitate. Basidioles 19–35×6.0–14 μm, clavate, subutriform, subcylindrical. Cystidia up to 40×(6.0–)9.0–13 μm, sublageniform, fusoid or narrowly clavate, hyaline to yellowish in KOH. Trama hyphae of tubes ± cylindrical, thin- to slightly thick-walled, gelatinised, non-dextrinoid, 2.0–12 μm wide, mostly with pale yellow walls in KOH. Pileipellis a trichoderm when young, later collapsing and similar to a cutis, consisting of interwoven, cylindrical or slightly inflated, mostly slightly thick-walled, smooth or minutely incrustated, 4.0–12 μm wide hyphae with mostly cylindrical, less frequently fusoid or clavate, up to 13 μm wide terminal cells. Stipe surface covered with a caulohyemenium composed of (1) lageniform, fusoid or rarely subclavate cystidia 25–46×6.0–13 μm, (2) clavate or subcylindrical basidioles 25–35×9.0–12 μm, and (3) scattered basidia, c. 38×12 μm, mostly 4-spored, clavate. Clamp-connections absent.

**Ecology.** It usually grows in thermophilic oak, hornbeam and beech forests on calcareous soils, often in more or less dense bundles.

**Distribution.** Very rare fungus. To date it has been recorded in the Czech Republic, Slovakia and Italy (GALLI 1998, HLAVÁČEK 1998). However, we presume a broader distribution covering the warmer parts of Europe.

**Material studied.** Czech Republic, Moravia, Mokrý-Horákov, Sivický les c. 1 km E of the village, on soil in oak forest with *Quercus petraea*, 17 Aug. 2006 leg. V. Antonín and A. Vágner (Antonín 06.33, BRNM 704900).

1



2



3



**Photos 1–3.** 1 – *Boletus satanas* Lenz f. *crataegi* (holotype, Mokrá-Horákov, Sivický les, 17 Aug. 2006): young basidiocarps. Photo: V. Antonín. 2 – *Boletus satanas* Lenz f. *crataegi* (Mokrá-Horákov, Sivický les, 26 July 2006): mature basidiocarps. Photo: J. Musil. 3 – *Boletus satanas* f. *crataegi* (Český kras / Bohemian Karst, Karlštejn national nature reserve, 5 Sept. 2007). Colour reaction of a context on cutting. Photo V. Janda.

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– Ditto, 22 Aug. 2006 leg. A. Vágner (holotype, BRNM 705237). – Ditto, 26 July 2006 leg. L. Straka (BRNU).  
– Ditto, 23 Aug. 2006 leg. L. Straka (BRNU). – Praha-Velká Chuchle, Homolka nature reserve, under *Carpinus* and *Quercus*, 25 Aug. 2007 leg. V. Janda (herb. V. Janda VJ 050907-04). – Bohemian Karst [Český kras], Karlík, Karlické údolí nature reserve, under *Fagus* and *Quercus*, 8 Sept. 2007 leg. T. Pavelka (herb. V. Janda VJ 080907-04).

The description by HLAVÁČEK (1998) coincides closely to our fungi in all characters except for smell. He described it as pleasant, with a touch of *Scleroderma*, without the typical unpleasant odour of *B. satanas*. We presume that he was referring to a young basidiocarp (see his photograph) which may have had a pleasant smell. F. Smotlacha was already aware that this fungus does not form a mycorrhizal relationship with *Crataegus*. However, the name *crataegi* is widely known in the literature, so we have employed it.

As *Boletus satanas* f. *crataegi* is a very rare fungus, it should be included in the Red List of macromycetes of the Czech Republic. The typical form of *B. satanas* is already included as a vulnerable species (ŠUTARA & JANDA 2006). The xanthoid form is poisonous, as is typical of *B. satanas* (HLAVÁČEK 1998).

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