

# ***Buglossoporus quercinus* IN THE OAK FORESTS OF THE BELGOROD REGION OF THE RUSSIAN FEDERATION**

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## **Article Information**

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## **ABSTRACT**

The object of research was the Polyporaceae community, referred to *Quercus robur* L. in the oak forests of the Belgorod region of the Russian Federation (southwest of the Central Russian Upland). The subject of research was rare species from the Polyporaceae community, referred to *Q. robur*. This study applied phytopathological and mycological methods. The findings showed that a rare species of wood-destroying fungi *Buglossoporus quercinus* [=Piptoporus quercinus] was found in the stands of overgrown oak forests of the Belgorod region of the Russian Federation (south-west of the Central Russian Upland). For the Belgorod region, this is a species not referenced in the relevant regional sources. New findings expand the understanding of the habitats of this species within its area and supplement the picture of its distribution on the Eurasian continent.

**Keywords:** *Buglossoporus quercinus*; oak forests; Belgorod region RF; rare species; fruiting body (basidiom).

## **INTRODUCTION**

The conservation of biodiversity both globally and regionally is a primary task for humanity [1]. The sources of its solution are the activities of specialists focused on identifying rare and endangered species in their natural habitats, considering and tracking rare and endangered species over time, and developing a set of measures for their conservation.

*Buglossoporus quercinus* (Schrad.) Kotl. & Pouzar [=Piptoporus quercinus (Schrad.) P.

Karst.] (Fomitopsidaceae Jülich) (Index fungorum, [2]), is a very rare Eurasian species of xylotrophic (polypore) fungi, closely associated in its development with *Quercus* species. Despite the fact that *B. quercinus* occupies a significant area, it is rarely found in nature [3,4], which, apparently, reflects the objective features of the existence of this species. In Russia, *B. quercinus* is known to grow in the Far East [3], the Southern Urals (Orenburg region) [5], in the Volga region [3,6] and Chernozemye (Lipetsk region) [1]. In neighboring Ukraine, *B. quercinus* was found in the Carpathians and Transcarpathia [3,7,8] and

relatively recently, in the Kharkov region [9], bordering the Belgorod region of the Russian Federation. In the Belgorod region, this species was first discovered by P. M. Nikolaev [10] in the reserved oak forest “Forest on Vorskla” (“Les na Vorskle”), however, the fact of this find was not reflected in regional sources. Currently, the fungus *B. quercinus* is one of the rare macromycetes with a high conservation status in many European countries [4,11,12,13,14,15,16].

This work presents a comprehensive description of these findings in connection with other known results and descriptions.

## MATERIALS AND METHODS

The object of research was the *Polyporaceae* community, referred to *Quercus robur* L. in the oak forests of the Belgorod region of the Russian Federation (southwest of the Central Russian Upland). The subject of research was rare species from the *Polyporaceae* community, referred to *Q.*

*robur*. This study applied phytopathological and mycocenological methods [17]. In the furtherance of a routine survey of oak stands of upland oak forests of the Belgorod Region in the 2017 season to study the species composition of the Polyporaceae community referred to *Quercus robur* L. in the oak forests of the southwest of the Central Russian Upland, and the prevalence of certain species of this community, the authors of this article discovered the fruiting bodies of a very rare fungus that is part of the oak consortium - *Buglossoporus quercinus* (Schrad.) Kotl. & Pouzar.

## RESULTS AND DISCUSSION

In the 2017 season, we found specimens of the fruiting bodies of *B. quercinus* on the stumps of old oaks in two upland oak forests of the Shebekinsky district of the Belgorod region of the Russian Federation. Thus, 2 localities of *B. quercinus* were found in the Belgorod Region (Fig. 1), described below.



**Fig. 1. Localities of *B. quercinus* in the Belgorod region of the Russian Federation (2017): ▲ - upland oak forest “Budennovskaya Dacha”, quarter No. 20; ● - upland oak forest “Nezhegolskaya Dacha”, quarter No. 42**

-Upland oak forest “Budennovskaya Dacha”, quarter No. 20, Shebekinsky forestry; type of forest conditions - D<sub>2</sub> (fresh oak forest); type of forest: sedge ash-oak (stellate-sedge); stand composition: 7O3A with single M, L (O is an English oak *Quercus robur*, A is an ash tree *Fraxinus excelsior*, M is a holly maple *Acer platanoides*, L is a small-leaved Linden tree *Tilia cordata*). One place is found on an old-oak stump. Date of discovery – 11.10.2017.

-Upland oak forest “Nezhegolskaya Dacha”, quarter No. 42, Shebekinsky forestry; type of forest conditions - D<sub>2</sub> (fresh oak forest); type of forest: sedge ash-oak (goutweed-sedge); stand composition: 7O3A with single M, L (O is an English oak *Quercus robur*, A is an ash tree *Fraxinus excelsior*, M is a holly maple *Acer platanoides*, L is a small-leaved Linden tree *Tilia cordata*); the average diameter of vegetating trees at chest level is D<sub>1.3</sub> = 43 ± 0.5 cm. One place is found on an old-oak stump. Date of discovery – 21.09.2017.

*B. quercinus* was first found in the stands of overgrown oak forests of the Belgorod region of the Russian Federation (south-west of the Central Russian Upland). For the Belgorod region, this is a re-found and described species, not referenced in regional sources. New findings expand the understanding of the habitats of this species within its area and supplement the picture of its distribution on the Eurasian continent (see Fig. 1).

Table 1 and Fig. 2 present typical external signs of the fruiting bodies (basidiomas) of *B. quercinus* found in the indicated localities.

*B. quercinus* basidiomas are annual, growing individually or in small groups, tongue- or fan-leaved, tapering to the base, laterally attached. The peripheral margin of basidiomas is smoothly rounded or uneven with protrusions (see Fig. 2), slightly pubescent and pale brown, or distinctly pubescent and dark brown (see Fig. 2). Sizes of fruiting bodies: longitudinally 8–13 cm, transversally 7–9 cm, 3–5 cm thick. In a fresh state, the basidiomas are fleshy and elastic; aging and drying basidiomas are fibrous-woody and brittle. The upper surface of mature *B. quercinus* basidiomas is leathery, creamy brown, slightly

pubescent and velvety to the touch. A darker color can be expressed at the base of the basidioma and along its peripheral edge (see Fig. 2). The hymenophore of mature fruiting bodies is brownish; the pores of the tubules are rounded, 2–4 pieces per 1 mm. The tubes themselves are 3–4 cm long, thin-walled, single-layer. The context (flesh) of basidiomas is noticeably thicker than the layer of tubules, dense in appearance, cream-colored, silky in appearance and to the touch.

**Table 1. *B. quercinus* fruiting body characteristics**

Dimensions	8–13 cm × 7–9 cm × 3–5 cm
Form	tongue- or fan-leaved
Color	brown
Surface	Slightly downy
Consistency	fleshy and fibrous
Hymenophore	tubular, 2–4 tubes × 1 mm <sup>-1</sup>



**Fig. 2. *B. quercinus* fruiting body on the old oak stump**

*B. quercinus* basidiomas can be found from May to December [3]; being soft and watery, they get dark, rot and lose their original features already a few weeks after the formation. According to our data, basidiomas of this type of *Polyporaceae* under local conditions can grow in August-September and, providing enough dry weather, can retain their more or less recognizable features until October-November. In trophic terms, *B. quercinus* is most likely a saprotroph. It populates the core part of the oak and causes central brown rot. If large oak stumps are populated, basidiomas of this species are formed in the central part of the stump (see Fig. 2). The wood decomposition rate with *B. quercinus* is relatively low. This may be due to the complexity of the nutrition of the

fungus in the core of the oak, characterized by the content of a large number of polyphenols and low pH. However, most likely, the slow development of the fungus has a combination nature and is a characteristic aspect of the ecological strategy of this species [11]. In fact, the slow and consistent destruction of wood allows *B. quercinus* mycelium to remain in the substrate for a long time and provides multiple formation of fruiting bodies over decades. However, due to poor understanding of this species by bioecologists, this issue remains open [13,14].

*B. quercinus* is rarely found in nature due to the following circumstances. 1. The species is confined to old oak trees and indigenous oak forests [13,14], which area is steadily reducing. 2) Short life of fruiting bodies bearing reproductive structures. 3) The formation of fruiting bodies in each particular place and the frequency of fruiting once every several tens of years are not regular. The last two circumstances should be considered when monitoring *B. quercinus* in a particular forest, since objective information on its distribution can be based only on data from long-term surveys conducted at the most favorable (in local conditions) season for fruiting and spore formation of this species [13].

## CONCLUSION

A rear species of wood-destroying fungi *Buglossoporus quercinus* [= *Piptoporus quercinus*] was found in the stands of overgrown oak forests of the Belgorod region of the Russian Federation (south-west of the Central Russian Upland). For the Belgorod region, this is species not referenced in the relevant regional sources. New findings expand the understanding of the habitats of this species within its area and supplement the picture of its distribution on the Eurasian continent.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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