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CONTRIBUTION TO THE KNOWLEDGE OF THE DISTRIBUTION OF THE RARE ORCHID *Epipogium aphyllum* Swartz IN BOSNIA AND HERZEGOVINA

PRILOG POZNAVANJU RASPROSTRANJENJA RIJETKE VRSTE ORHIDEJE *Epipogium aphyllum* Swartz U BOSNI I HERCEGOVINI

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Abstract

In 2020, a new site of the ghost orchid (*Epipogium aphyllum* Swartz) was found in the area of Mt. Jadovnik, near Drvar in the western part of Bosnia and Herzegovina. This mycoheterotrophic orchid belongs to one of the rarest and least known species of orchids in the world. The paper gives a brief description of the ecology of the species, a description of the habitat conditions in the site area, and an overview of the previous records for Bosnia and Herzegovina. It was found in beech and fir dominated primeval forest, in Visučka draga on Mt. Jadovnik. So far, it has been confirmed in only a few locations in Bosnia and Herzegovina.

Key words: Bosnia and Herzegovina, ghost orchid, location, *Orchidaceae*, rare plants

1. INTRODUCTION / UVOD

Most European orchid species are autotrophic, but there are also a few myco-heterotrophic ones, which feed on decaying organic matter obtained by mycorrhizae with fungi. This relationship is known in the genus *Epipogium* Borkh. and *Neottia* Guett. whose species do not contain chlorophyll at all, while species from the genus *Limodorum* Boehm. and *Corallorhiza* Gagnebin contains very little chlorophyll (Delforge, 2006; Šegota & Alegro, 2011).

The genus *Epipogium* Borkh. is composed of several species, of which only the species *Epipogium aphyllum* has a Eurosiberian distribution (Lauber & Wagner, 1998; Šegota & Alegro,

2011). The genus *Epipogium* Borkh. is represented by only one species in the flora of Bosnia and Herzegovina – *Epipogium aphyllum* Sw. (Šabanović et al., 2021).

Epipogium aphyllum Swartz – ghost orchid (syn.: *Epipactis epipogium* (L.) All.; *Satyrium epipogium* L.; *Epipogium gmelinii* Rich.) is a species of temperate-boreal climate (Baumann et al., 2006; Šegota & Alegro, 2011), whose range extends from northern Europe (Scandinavia, Russia) through central Europe, south to the Pyrenees, central Apennines, north-western parts of Greece and Crimea (Figure 1) (Moore, 1980; Šegota & Alegro, 2011).



Figure 1. Distribution range of the species *Epipogium aphyllum* Sw. / **Slika 1.** Areal vrste *Epipogium aphyllum* Sw. (Source / Izvor: Meusel et al., 1965)

It most often inhabits beech forests, mixed beech and fir forests, spruce forests, as well as mixed beech, fir and spruce forests. The species is sciophyte or semi-sciophyte, it grows in mesothermophilic or frigoryphilic habitats, on moderately moist or wet, oligotrophic soils, in places with high air humidity, often near streams and springs (Đorđević, 2021). It occurs on different substrates, most often on the basic ones, at elevations up to 1900 m a.s.l. (Baumann et al., 2006).

The ghost orchid is a myco-heterotrophic species of orchid, without chlorophyll, which can also bloom during July-August, every few years at irregular intervals, and often blooms and bears fruit underground, which is why it is very difficult to notice and follow its development cycles in one locality. It usually occurs in small populations, consisting of only a few individuals (Caković et al., 2017).

The first documented discovery of the ghost orchid in the territory of Bosnia and Herzegovina was mentioned in the paper of Handell-Mazzetti and Janchen as of 1905, under the name *Epipogon*

aphyllum (Schm.) Sw. As a site, they mentioned a place next to a stream above the settlement Potoci on Mt. Klekovača, at an altitude of about 1100 m a.s.l.; and at the western foot of Stevanov Palež at an altitude of 1200 m a.s.l. (Handell-Mazzetti et al., 1905). During the research on the flora of Mt. Klekovača (Milanović et al., 2015), the authors did not confirm these records. Malý (1935) documented the species on Mt. Ravna Planina near Pale, at an altitude of about 1410-1460 m a.s.l. Dizdarević et al. (1984) reported it from the stand of Serbian spruce (*Picea omorika*) on Stolac Mt. in eastern BiH (Figure 3).

Šilić (2002) only mentioned this species for the protected area Blidinje, however, without more specific information about the exact location.

The species *Epipogium aphyllum* is also on the list of plant species recorded in the potential protected area Prača (Kovačević et al., 2021), but without specific information about the precise location.

The area of Mt. Jadovnik was elaborated floristically by Bucalo (2015), but the ghost orchid is not on the list of flora. The discovery of the ghost

orchid on Mt. Jadovnik represents a new record of this species on the territory of Bosnia and Her-

zegovina and at the same time a contribution to the knowledge of the flora of Mt. Jadovnik.

2. MATERIAL AND METHODS / MATERIJAL I METOD RADA

The research included the collection of literature and field data. Field research was conducted in the growing season 2020–2022 in the Mt. Jadovnik area. Special attention was dedicated to the research of the flora of the old-growth forest-type habitats of beech, fir and spruce. The herbarium material was collected and stored in the author's private herbarium. The material collected in the field was determined according to Flora Europaea

(Moore, 1980) and other sources (Đorđević, 2021). Coordinates were recorded using the WGS84 coordinate system. The habitat information, including elevation, exposure, slope, phytocoenological affiliation, geological substrate, and soil was also collected. All known localities of this species in Bosnia and Herzegovina were shown on the map using a 10x10 km MGRS grid (Figure 3). The nomenclature follows Stupar et al. (2021).

3. RESULTS / REZULTATI

The ghost orchid (*Epipogium aphyllum* Swartz) was found on 27 July 2020 on Mt. Jadovnik near Drvar in the western part of Bosnia and Herzegovina (Figure 2), in Visućka draga. The site is located in a brook between two slopes above the

source of the Visućka stream, in the old-growth forest of beech and fir (Figure 4), at an elevation of 1100 m a.s.l. The coordinates of the site are 44.276328°N and 16.439268°E, eastern exposure, 5° slope.

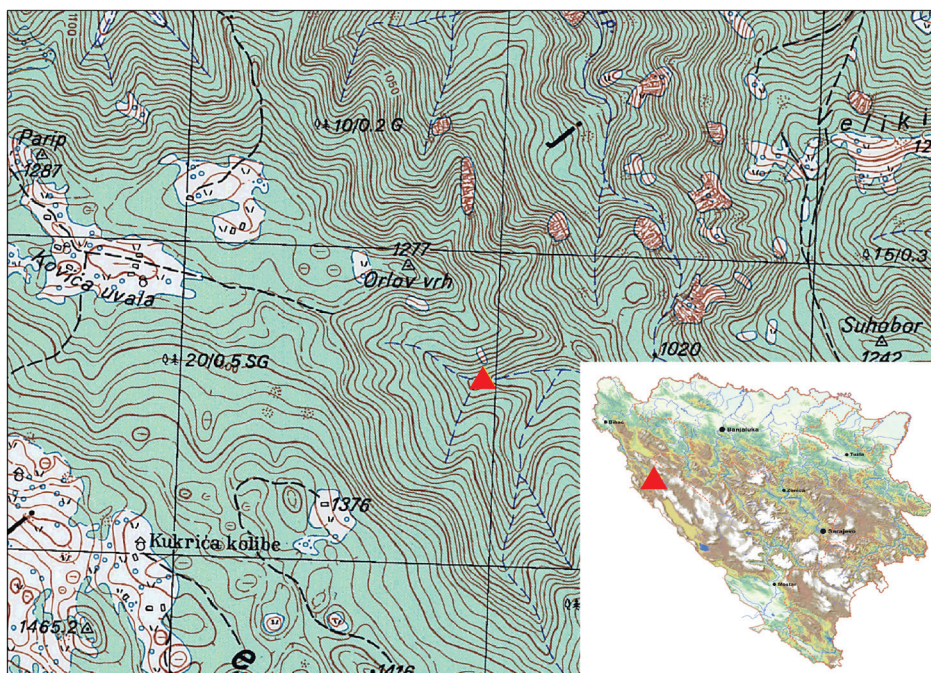


Figure 2. Map of the site of the ghost orchid (*Epipogium aphyllum* Sw.) on Mt. Jadovnik / Slika 2. Karta nalazišta bezlisnog nadbradca (*Epipogium aphyllum* Sw.) na planini Jadovnik

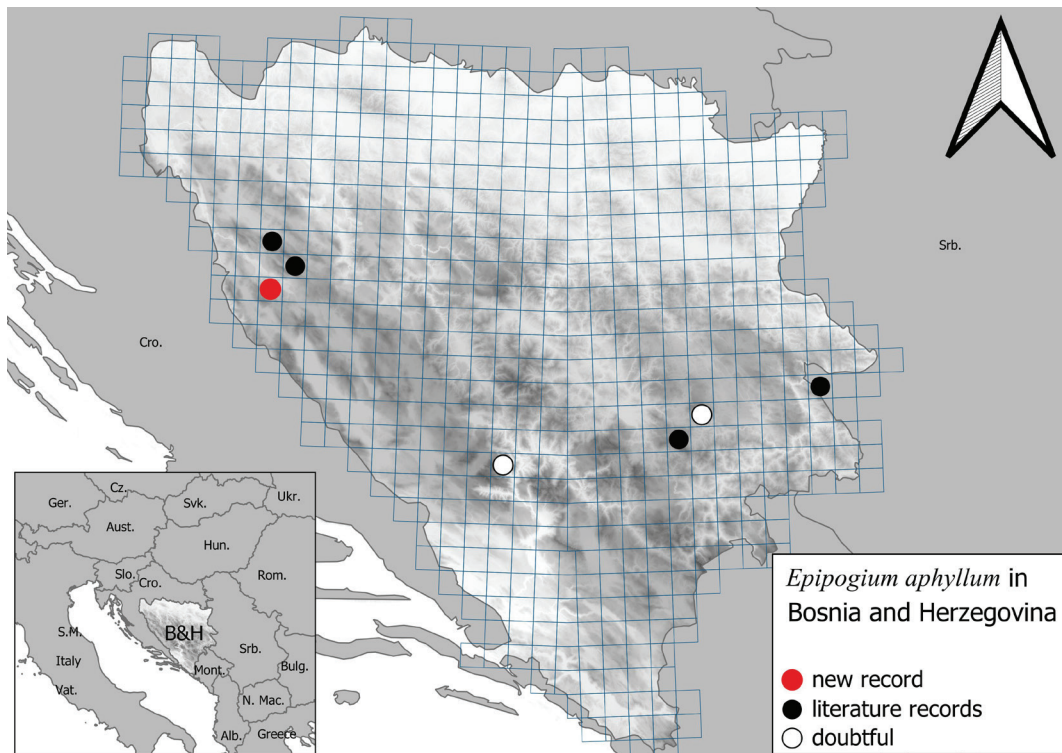


Figure 3. Distribution of *Epipogium aphyllum* in Bosnia and Herzegovina / **Slika 3.** Karta rasprostranjenja vrste *Epipogium aphyllum* u Bosni i Hercegovini



Figure 4. Photo of the site where the ghost orchid was recorded / **Slika 4.** Fotografija nalazišta bezlisnog nadbradca (© S. Brujić, August 2022)

The bedrock is dolomite, and the soil is a mixture of Colluvium and Calcocambisol, with very thick layers of humus and leaf litter.

At the given site, several specimens of the ghost orchid were found (Figure 5), one of which was collected for determination and herbarium. In the following two years (2021 and 2022), the presence of ghost orchids was not observed in the same locality.

Species is listed in the “Red List of Flora of the Federation of Bosnia and Herzegovina”, however, with DD (data deficient) category (Đug et al., 2013). Furthermore, according to the IUCN Red List of species, it was classified into the category LC - least concern (Bilz, et al. 2011).

Considering the above and given the fact that the site of the ghost orchid in Visučka Draga is located in the forests designated as “Forests of high protective value” - HCVF 4.1 - Forests significant for the regulation of the water regime (Avdibegović et al., 2017), as well as the fact that the areas around and on the site are not managed since the site is located near the minefields, the conservation status of this species in Mt. Jadovnik could be estimated as favorable.



Figure 5. The ghost orchid – *Epipogium aphyllum* Swartz, Visučka draga, Mt. Jadovnik / **Slika 5.** Bezlisni nadbradac – *Epipogium aphyllum* Swartz, Visučka draga, Jadovnik (© S.Brujić, July 2020)

4. CONCLUSION / ZAKLJUČAK

Considering the ecology of the species, it can be expected the ghost orchid to be found in many other mountains and habitats throughout Bosnia and Herzegovina, especially within primeval complexes such as Lom, Janj, Perućica, etc. However, since it is a species with a short stature and

pale color, which blooms at irregular intervals and can only be seen on the surface during flowering, with the possibility of underground flowering (Delforge, 2006; Šegota & Alegro, 2011), the discovery of new sites might be considered to be primarily the result of luck and chance.

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Sažetak

Rijetka vrsta orchideje *Epipogium aphyllum* Sw. zabilježena je na lokalitetu Visučka draga na planini Jadovnik, u zapadnom dijelu Bosne i Hercegovine. Ovo predstavlja novo nalazište ove vrste u Bosni i Hercegovini, koje se nalazi u blizini ranije registrovanih nalazišta na susjednoj planini Klekovači. Nekoliko primjeraka je registrovano na 1100 m nadmorske visine, u sinklinali neposredno iznad potoka, u bukovo-jelovoj sastojini prašumskog tipa. Herbarski primjerak se nalazi u ličnom herbarijumu autora.

Ključne riječi: bezlisni nadbradac, Bosna i Hercegovina, nalazište, orchideje, rijetke biljke