

**DACTYLORHIZA ROMANA (ORCHIDACEAE), A NEW
SPECIES IN THE FLORA OF KOSOVO AND METOHIJA**

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Abstract

Dactylorhiza romana (Sebast.) Soó (Orchidaceae) was found in April 2023 in the northern part of the Šar-Planina Mountains at Štrpce (Vrbeštica). This is the first record of this Mediterranean-Submediterranean species in Kosovo and Metohija. Data on its morphology, flowering period, distribution, habitat preferences, population size, and conservation status are provided. The species was recorded at 1031 m a.s.l. as a member of the grassland community *Festucetum valesiacae* s.l. Long-term monitoring and carefully planned in situ conservation of the population and its habitat in this part of the Balkan Peninsula are necessary.

Key words: *Dactylorhiza*, orchid, Kosovo and Metohija, Serbia, Balkan Peninsula

Introduction. Representatives of the genus *Dactylorhiza* Neck. ex Nevski (Orchidaceae) are distributed mainly in temperate and boreal regions, primarily in Europe, as well as in western and northern Asia, the Himalayas, North Africa, and Alaska [1–5]. The highest phylogenetic and genetic diversity, together with a high degree of endemism within this genus, is found in the Mediterranean regions and the Caucasus [6]. The main centres of diversity for this genus are the Carpathians, the Balkan Peninsula, Western Europe (Great Britain, Germany, and southern Scandinavia), and Asia Minor [1].

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Dactylorhiza is a taxonomically complex genus, consisting of seven groups in Europe, North Africa, and the Middle East: the *D. iberica*, *D. sambucina*, *D. incarnata*, *D. majalis*, *D. traunsteineri*, *D. maculata*, and *D. praetermissa* groups [2]. However, according to AVERYANOV [1], there are four sections (*Dactylorhiza*, *Aristatae*, *Sambucinae*, and *Iberanthus*) and several subsections and aggregates within this genus. In total, the genus comprises 45 species and 41 subspecies, with 14 species and 10 subspecies recorded in the countries of the Balkan Peninsula [4].

The orchid flora of Serbia includes ten species and subspecies of the genus *Dactylorhiza*: *D. cordigera* (Fr.) Soó subsp. *cordigera*, *D. cordigera* subsp. *bosniaca* (Beck) Soó, *D. fuchsii* (Druce) Soó subsp. *fuchsii*, *D. incarnata* (L.) Soó subsp. *incarnata*, *D. maculata* (L.) Soó subsp. *maculata*, *D. maculata* (L.) Soó subsp. *transsilvanica* (Schur) Soó, *D. majalis* (Rchb.) P.F.Hunt & Summerh. subsp. *majalis*, *D. romana* (Sebast.) Soó subsp. *romana*, *D. saccifera* (Brongn.) Soó subsp. *saccifera*, and *D. sambucina* (L.) Soó [7–9]. However, in the region of Kosovo and Metohija, the genus is represented to date by eight species and subspecies: *D. cordigera* (Fr.) Soó subsp. *cordigera*, *D. cordigera* subsp. *bosniaca* (Beck) Soó, *D. incarnata* (L.) Soó subsp. *incarnata*, *D. maculata* (L.) Soó subsp. *maculata*, *D. maculata* (L.) Soó subsp. *transsilvanica* (Schur) Soó, *D. majalis* (Rchb.) P.F.Hunt & Summerh. subsp. *majalis*, *D. saccifera* (Brongn.) Soó subsp. *saccifera*, and *D. sambucina* (L.) Soó [7–9].

This study reports the first record of *Dactylorhiza romana* (Sebast.) Soó subsp. *romana* in the flora of Kosovo and Metohija. The aims of the study were: i) to provide a morphological description, ii) to present its currently known distribution, iii) to establish its habitat and ecological preferences, and iv) to investigate its population size and conservation status.

Materials and methods. During a floristic survey of the Šar-Planina Mountains (Kosovo and Metohija) conducted in April 2023, data were collected on the morphology, distribution, habitat preferences, and population size of *D. romana*. The species was identified according to DELFORGE [2], and nomenclature followed POWO [4]. For documentation, one specimen of *D. romana* (without roots and tubers) was collected and deposited in the Herbarium of the Institute of Botany and Botanical Garden “Jevremovac”, University of Belgrade (BEOU). The morphological descriptions of the species are provided here based on measurements and observations made during fieldwork, as well as according to Delforge [2], KREUTZ [5], and BAUMANN et al. [10]. The values of the measured characteristics and the colours of specific features of the specimen from Kosovo and Metohija are shown in bold.

The geographic coordinates (longitude and latitude) and altitude were recorded using a Garmin eTrex 32 handheld GPS device in the World Geodetic System 84 (WGS 84) format. The distribution of *D. romana* in Kosovo and Metohija, and in Serbia proper, was mapped on a grid map with squares of 10 × 10 km, based on the Universal Transverse Mercator (UTM) projection, grid zone 34T.

The methodology of BRAUN-BLANQUET [11] was used to determine the plant community of the stand with *D. romana*, while the habitat type was determined according to the EUNIS habitat classification (<http://eunis.eea.europa.eu/>). The bedrock type was determined using the geological map of the study area at a scale of 1:100 000 (<https://geoliss.mre.gov.rs/prez/OGK/RasterSrbija/>). The population size of *D. romana* was determined by counting the total number of flowering individuals during fieldwork.

Results and discussion. *Dactylorhiza romana* (Sebast.) Soó subsp. *romana* (Fig. 1). Synonyms: *Dactylorchis romana* (Sebast.) Verm., *Dactylorhiza sambucina* subsp. *romana* (Sebast.) Bornm., *Orchis romana* Sebast., *Orchis pseudosambucina* Ten., *Orchis mediterranea* Klinge, *Orchis mediterranea* subsp. *pseudosambucina* (Ten.) Klinge, *Dactylorhiza sulphurea* subsp. *pseudosambucina* (Ten.) Franco.

Morphology. A perennial plant, 15–23–25 (–50) cm high, with two tubers and roots. Stem stiff, pale to dark green, usually suffused with purple in the upper part. Leaves 3–9, unspotted, pale to dark green, slightly shiny and arched, linear-lanceolate. The lowermost leaves are clustered in a basal rosette, 8.5–13.4–20 cm long and 0.5–1–3.5 cm wide; median leaves narrowly lanceolate and obliquely erect; uppermost leaves bract-like. Inflorescence 4–7.3–8 cm long, initially ovoid-elongate, becoming nearly cylindrical, dense then lax, with (5–) 10–18 (–30) pale whitish-yellow to sulphur yellow or light to dark **magenta** flowers (these two forms often grow together). Bracts 20–28 mm long and 3–6 mm wide, green (for yellow flowers) or dark **purplish-green** (for magenta flowers), slightly longer than the flowers. Sepals ovate-lanceolate to oblong-ovate, obtuse; lateral sepals asymmetrical, broadly oval, vertically erect, (6–) 8.5–10 (–13) mm long and (3–) 5–7 (–9) mm wide; dorsal sepal ovate-lanceolate, decurved, 7.5–9 mm long and 3.5–4.5 mm wide. Dorsal sepal and petals form a hood. Petals ovate to ovate-lanceolate, decurved, 7–9 mm long and 5–6.5 mm wide. Lip broadly ovate to roundish, rarely trapezoidal; lower part slightly three-lobed, yellow (brighter than sepals) or **magenta** (as sepals), often with a whitish base and middle part, unspotted, usually wider than long, 7.5–12 mm long and (8–) 10–13 (–18) mm wide. Middle lobe 2.5–3.5 mm long and 4–5 mm wide, rounded, slightly narrower than the lateral lobes. Lateral lobes broadly falcate, usually slightly shorter than the middle lobe, with rounded, slightly denticulate margins. Spur cylindrical, ascending to vertical, steeply curved upwards, 10–15–25 mm long and 1.5–2 (–3) mm wide, longer than the ovary.

Taxonomic notes and differentiation from other species. *Dactylorhiza romana* belongs to the *D. sambucina* group [2]. A recent study of the European–Mediterranean–Oriental *Dactylorhiza romana/sambucina* polyploid complex, focusing on patterns of genetic and morphological variation, indicated that the following taxa are accepted: *D. romana* subsp. *romana*, *D. romana* subsp. *guimarae-sii* (E.G. Camus) H.A. Pedersen, *D. romana* subsp. *georgica* (Klinge) Soó ex Renz



Fig. 1. *Dactylorhiza romana* subsp. *romana* (all from Kosovo and Metohija, Šar-planina Mountains, Štrpce, Vrbeštica, 29 April 2023, photos by M. Veljković): (A) habitus, (B) inflorescence, and (C) flower

& Taubenheim, *D. sambucina* (L.) Soó, *D. cantabrica* H.A.Pedersen, and *D. insularis* (Sommier) Landwehr [12]. Furthermore, the study highlights that the levels of genetic diversity suggest that *D. romana* s.s. is the least derived member of the complex [12]. The population of *D. romana* from Kosovo and Metohija is identified as *D. romana* subsp. *romana*.

Dactylorhiza romana is similar to *D. sambucina* and *O. provincialis* Balb. ex Lam. & DC. *Dactylorhiza sambucina* differs from *D. romana* by its spotted lips, robust spurs that descend and curve downwards, and broader leaves (lanceolate, ovate-lanceolate to oblong-ovate). *Orchis provincialis* differs from *D. romana* by its strongly spotted basal leaves, paler yellowish flowers, membranous bracts that are yellowish-green, (8–) 10–20 mm long, as long as or longer than the ovaries, spotted lips, and ovate-ellipsoid tubers [2, 5, 10, 13].

Flowering period. On 29 April 2023, specimens of *Dactylorhiza romana* in the Šar-Planina Mountains at the locality of Štrpce (Vrbeštica) were at their flowering peak. This corresponds with the flowering period reported by Delforge [2], who stated that this species flowers from March to June. In Greece, the species flowers from the end of March to the end of May [13], while in Serbia proper, it was found at its flowering peak in the first week of April [14].

Pollination. *Dactylorhiza romana* is a cross-pollinating, deceptive orchid, and the pollinators are bumblebee queens and other bees [15, 16]. This orchid species employs generalised food deception, a mechanism in which its flowers display general floral signals, typical of rewarding plant species.

General distribution. *Dactylorhiza romana* is distributed throughout the Mediterranean and extends into Central Asia [4]. *Dactylorhiza romana* subsp. *romana* is distributed across most of the species' range, including Albania, Bulgaria, Cyprus, the East Aegean Islands, Greece, Italy (including Sicily), Crete, Crimea, Croatia, Lebanon-Syria, Montenegro, North Macedonia, Romania, Serbia, and Türkiye (including European Türkiye) [2, 4, 5, 8, 13, 17]. *Dactylorhiza romana* subsp. *georgica* is found in Iran, Iraq, the North Caucasus, Transcaucasus, Turkmenistan, and Türkiye, whereas *D. romana* subsp. *guimaraesii* has been recorded in Algeria, Morocco, Portugal, and Spain [4].

Distribution in Kosovo and Metohija. *Dactylorhiza romana* subsp. *romana* has been recorded in the region of Kosovo on Mts Šar-Planina, Štrpce (Vrbeštica), N 42.232519°, E 20.991536°, MGRS 34T DM97, 1031 m a.s.l., *Festucetum valesiaca* s.l., ophiolitic mélange with olistoliths in contact with marble limestones, exp. S, incl. 10°, 29 April 2023; coll. M. Veljković, det. V. Djordjević, M. Veljković (BEOU 72770) (Fig. 2).

The discovery of *D. romana* in the northern part of the Šar-Planina Mountains is the first record of this species in Kosovo and Metohija. Previously, it was found in Serbia proper in the following regions and localities (Fig. 2): Eastern Serbia (Niš: Gabrovac, and Seličevica); Southeastern Serbia (Crvena Jabuka, and Deščani Kladenac); Southern Serbia (Mt. Rujan); and Central Serbia (Mt. Vidojevica: Dobrotić) [7, 14, 18]. The finding of this species at Štrpce (Vrbeštica) is the first record in the MGRS 34T DM97 10 × 10 km and DM 100 × 100 km UTM grid cells. This locality currently represents the southwesternmost limit of the species' distribution throughout Serbia.

Habitat and ecology. *Dactylorhiza romana* was found in the northern part of the Šar-Planina Mountains in the rocky-grassland community *Festucetum valesiaca* s.l. The following accompanying taxa were recorded at the site with *D. romana* subsp. *romana*: *Festuca valesiaca* Schleich. ex Gaudin, *Achillea nobilis* Rochel ex Nyman, *Thymus jankae* Čelak., *T. pulegioides* L., *Dorycnium germanicum* (Gremli) Rikli, *Ranunculus millefoliatus* Vahl, *Moenchia mantica* (L.) Bartl., *Trifolium ochroleucum* Rostk. & Schmidt, *Fragaria viridis* Weston, and *Anacamptis morio* (L.) R.M.Bateman, Pridgeon & M.W.Chase. According to the

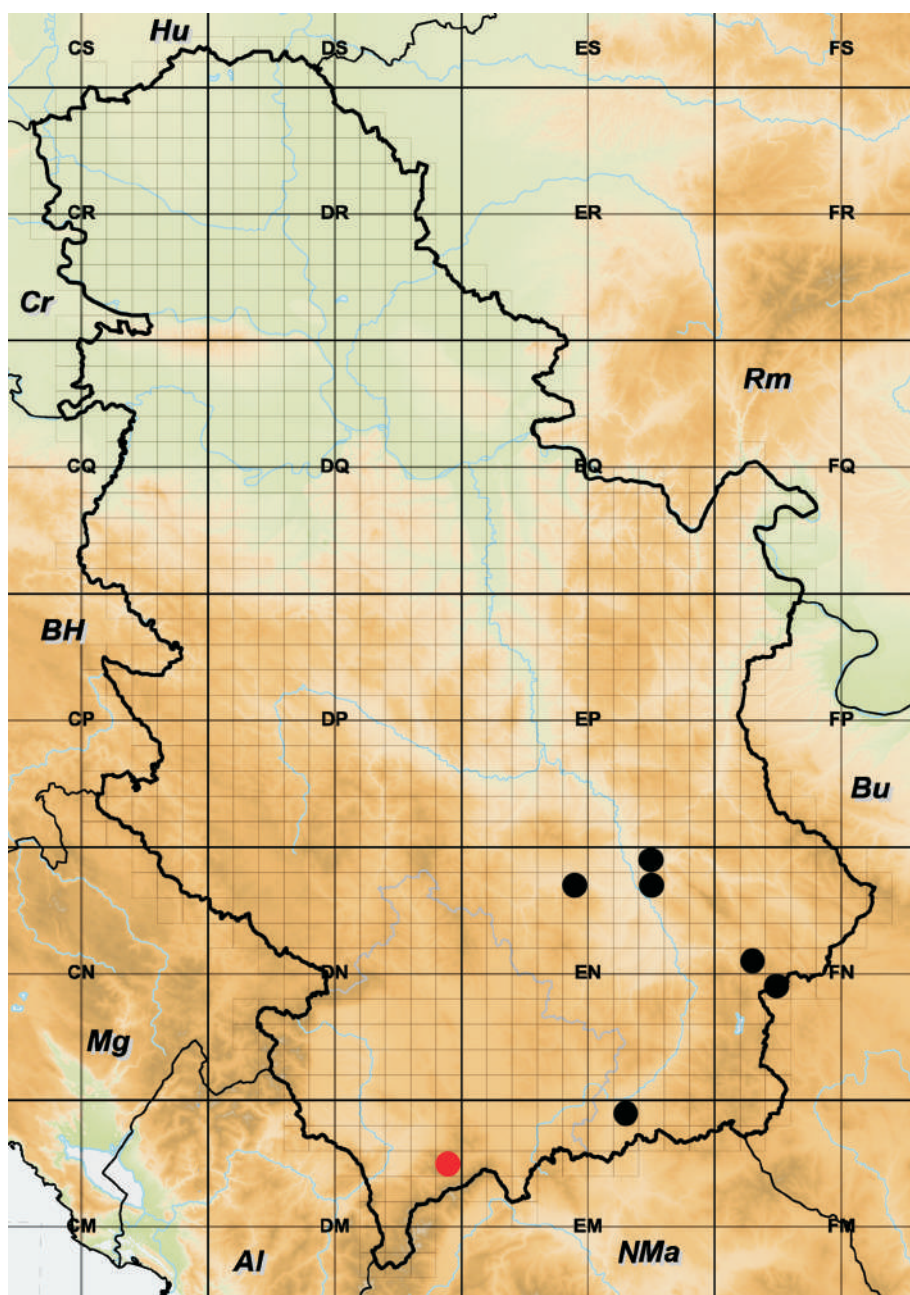


Fig. 2. Distribution of *Dactylorhiza romana* subsp. *romana* in Kosovo and Metohija (red dot) and Serbia proper (black dots)

EUNIS classification, this habitat type belongs to the arid subcontinental steppic grassland (*Festucion valesiacae*) (E1.22 code; <https://eunis.eea.europa.eu/habitats/1846>). The species was found in the contact zone of ophiolitic mélange with olistoliths and marble limestone, under full light conditions, at an altitude of 1031 m, on a south-facing slope with an inclination of 10°.

Although *D. romana* is known to inhabit grassland communities, it often occurs in shrub habitats such as maquis and garrigue, as well as in thermophilous oak forests and their openings [2, 10, 13, 17]. In Greece, it has been recorded in maquis and *Quercus coccifera* scrubs [13]. At the locality of Nomos and Eparchia Korinthias (Greece), it was found at the edge of Mougosto forest, in association with *Vicia laeta* Ces., where *Cistus creticus* L. and *C. monspeliensis* L. predominated at the forest margin [19]. A recent study from Central Serbia indicated that the species occurs in thermophilous oak forest communities [14].

The species occurs from lowland areas to high mountain regions, with a recorded altitudinal range between 0 m and 2000 m [2, 10], up to 1550 m in Greece [13], and up to 1800 m in Italy [17]. It is found in full light to shade, on moderately dry to moist soils with alkaline to acidic reactions [2, 5, 13]. In southern Greece, it occurs mainly on calcareous substrates, whereas in northern Greece it is mainly found on siliceous substrates [13]. A recent study from Serbia proper indicated that on Mt. Vidojevica (Dobrotić), the species occurs on siliceous substrate, specifically on gneisses [14].

Population size. Two individuals of *D. romana* were recorded in an area of approximately 100 m².

Conservation. As a member of the family Orchidaceae, *D. romana* is included in the Annex II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). According to Serbian legislation, it is a protected species. The species is classified as Endangered (IUCN: EN) in Ukraine and as Vulnerable (IUCN: VU) in Georgia, Spain, and Bulgaria [20]. Conservation priorities should focus primarily on in situ protection of its habitats. The main threats to *D. romana* in the northern part of the Šar-Planina Mountains are habitat destruction, erosion, and global warming.

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