

## VIOLA COLLINA BESSER IN CROATIA

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The presence of *Viola collina* in Croatia was previously not ascertained, but in 2008 it was discovered in three regions of Croatia: the Samobor, Papuk and Kalnik mountains. The Croatian localities of *V. collina* are briefly characterized. Habitat preference of the species is discussed with emphasis on the analogy revealed between Hungarian and Croatian *V. collina* habitats.

**Key words:** *Viola collina*, Croatia, flora, habitat preference, relict species

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Prisutnost vrste *Viola collina* u Hrvatskoj nije dosad bila potvrđena, ali 2008 je otkrivena na tri područja u Hrvatskoj: Samoborskom gorju, Papuku i Kalniku. Ukratko se opisuju ti lokaliteti. Raspravlja se o izboru staništa, s naglaskom na otkrivenu analogiju između mađarskih i hrvatskih staništa.

**Ključne riječi:** *Viola collina*, Hrvatska, flora, izbor staništa, reliktna vrsta

### INTRODUCTION

*Viola collina* Besser is a Eurasian species with two main distribution centres: the eastern centre (mountains near the River Amur, the Korean Peninsula and Japan) and the western one (from the Baltic region to central European mountains). A few localities of the species are known in the mountains of central Asia and south Siberia (BECKER, 1910, GAMS, 1926, MEUSEL *et al.*, 1978).

In central Europe *V. collina* occurs from the colline to the subalpine zone, preferring sunny or slightly shady habitats and calcareous bedrock. The habitat preference of the species is varied, however, usually it grows in rocky habitats (DOMIN,

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1928; SCHMID, 1936; TOMAŽIĆ, 1940; WENDELBERGER, 1963; SKALICKÝ, 1966; STROBL, 1989; KIRSCHNER & SKALICKÝ, 1990; ELLENBERG, 1996; BAUER & MÉSZÁROS, 2000; BOUBLIK *et al.*, 2007; WALENTOWSKI *et al.*, 2007).

Concerning the presence of *V. collina* in Croatia the relevant literature records are contradictory. Although the species was not mentioned by SCHLOSSER & VUKOTI-NOVIĆ (1857, 1869), HAYEK (1927), ŠEGULJA (1997) and DOMAC (2002), it was registered (»Hrvatska«) by TRINAJSTIĆ (1975: 45). Unfortunately, the source of the latter record is unknown. Recently, a new occurrence of *V. collina* was recorded in the Croatian Flora Database (Lika, National Park »Plitvička jezera«, 15.VII.2006, Jogan *et al.*) (NIKOLIĆ, 2009). However, the identification of the species in such a late phenophase (July) is rather difficult, and this record accordingly needs confirmation.

In Slovenia, *V. collina* occurs in the Alps, the foreland of the Alps and the Dinaric Mts (MARTINČIĆ, 2007). The species is not registered in the flora of Serbia (DIKLIĆ, 1972), and only one old record is known from Bosnia (BECK, 1887). Although the latter record was questioned by BECKER (1910), the Bosnian occurrence is signed on the distribution map of *V. collina* in MEUSEL *et al.* (1978).

In Hungary there are some old literature records of the species from the Transdanubian Mountain Range (BORBÁS, 1879, 1900; PILLITZ, 1910) supported by voucher specimens. Albeit these records have not been confirmed for many decades, a new occurrence of *V. collina* in the Bakony mountains was reported by MÉSZÁROS (1997). BAUER & MÉSZÁROS (2000) published new localities and studied the habitat preference of the species in the narrow region. Recently SOMLYAY (2009) surveyed the distribution of *V. collina* in the Buda and Pilis mountains adding further data to the habitat preference of the taxon in Hungary.

## MATERIALS AND METHODS

Specimens of *V. collina* and *V. hirta* stored in BP, ZA, ZAHO were checked. *Viola hirta* is often mistaken for *V. collina*, albeit their main diagnostic characters are relatively easily recognizable even in the field. In *V. hirta* the colour of the spur is  $\pm$  similar to that of petals, the lamina is often elongate-triangular, the bracteoles are mostly inserted below the middle of the peduncle, the elongated to narrowly triangular stipules are entire or shortly fimbriate. In *V. collina* the spur is  $\pm$  paler than petals (usually whitish), the lamina is rotundate-ovate to ovate, the bracteoles are mostly inserted at or above the middle of the peduncle, the ovate-lanceolate to narrowly lanceolate stipules are long and fimbriate, and the fimbriae are ciliate (see HODÁLOVÁ *et al.*, 2008).

Field trips were carried out in the northern (»Pannonian«) regions of Croatia in spring and summer, 2008. Coordinates (WGS-84) of the *V. collina* localities discovered in Croatia were recorded. Relevant data of voucher specimens (stored in BP) are presented.

In the absence of relevés the Croatian localities of *V. collina* are characterized by the accompanying species and general aspects of surrounding vegetation, scientific names not being given to the plant associations concerned. Nomenclature of species follows NIKOLIĆ (1994, 1997, 2000, 2009).

## RESULTS AND DISCUSSION

### Croatian localities of *Viola collina* discovered

No correctly identified herbarium specimen of *V. collina* from the territory of Croatia could be found in the main Croatian herbaria (ZA, ZAHO) and in BP. However, a single specimen collected by Ivo Horvat on the 25th of June, 1954, and labelled as *V. hirta* L. was discovered in ZAHO, which belongs to *V. collina*. While checking the locality (»Samoborska gora: Oštrc«) of this specimen we found small stands of *V. collina* on Mt Veliki Oštrc. Shortly afterwards the species was discovered in the Papuk and Kalnik mountains as well. The relevant data of the six voucher specimens collected in 2008 are as follows:

- 1) Samobor mountains, Rude: ridge west of the peak of Mt Veliki Oštrc (45°45'40,2"; 15°38'46,7"), dolomite rocky grassland, ca 720 m, 28.IV.2008 (single specimen without flower)
- 2) Samobor mountains, Rude: peak of Mt Veliki Oštrc (45°45'42,6"; 15°38'54,6"), mosaic of dolomite rocky grassland and shrub forest patches, ca 740 m, 28.IV.2008
- 3) Papuk mountains, Velika: southern slope of Mt Mališćak (45°28'34,6"; 17°38'29,3"), clearing of a xerotherm oak forest on dolomite, ca 580 m, 30.IV.2008
- 4) Papuk mountains, Velika: northern slope of Mt Pliš (45°28'24,4"; 17°38'35,2"), closed dolomite rocky grassland under *Pinus nigra* plantation, ca 520 m, 30.IV.2008
- 5) Kalnik mountains: Stari grad (46°08'00,4"; 16°27'52,5"), northern rocky slope of a beech forest on limestone, ca 500 m, 1.V.2008
- 6) Kalnik mountains: Mt Vranilac (46°07'53,5"; 16°27'18,0"), northern rocky slope of a beech forest on limestone, ca 630 m, 1.V.2008

### Characterization of the localities

In the Samobor mountains (Mt Veliki Oštrc) small *V. collina* stands were discovered in forest fragments composed of shrub-sized trees of *Acer obtusatum* W. et K. ex Willd., *Fagus sylvatica* L., *Fraxinus ornus* L., *Ostrya carpinifolia* Scop., *Sorbus aria* agg. and *Quercus pubescens* Willd.. Characteristic components of the herb layer were *Calamagrostis varia* (Schrad.) Host, *Carex humilis* Leyss., *Cirsium pannonicum* (L.f.) Link, *C. erisithales* (Jacq.) Scop., *Clematis recta* L., *Cyclamen purpurascens* Mill., *Erica herbacea* L., *Erythronium dens-canis* L., *Geranium sanguineum* L., *Helleborus niger* L., *Hepatica nobilis* Schreber, *Iris graminea* L., *Laserpitium latifolium* L., *L. siler* L., *Peucedanum carvifolia* Vill., *P. cervaria* (L.) Lapeyr., *Polygonatum odoratum* (Mill.) Druce, *Trifolium montanum* L., etc. Some *V. collina* specimens were also found in open, somewhat shaded, patches of the neighbouring rocky grasslands dominated by *Sesleria kalnikensis* Jáv. and characterized by *Amelanchier ovalis* Medik., *Biscutella laevigata* agg., *Campanula thyrsoidea* L., *Carex humilis*, *Daphne cneorum* L., *Erica herbacea*, *Genista januensis* Viv., *G. radiata* (L.) Scop., *Leontodon incanus* (L.) Schrk., *Linum viscosum* L., *Prunella grandiflora* (L.) Scholler and *Veronica austriaca* ssp. *jacquinii* (Baumg.) Eb. Fisch., among others.

In the Papuk mountains, built up of mainly metamorphic bedrocks *V. collina* was discovered in the close vicinity of Velika village, where dolomite bedrock is on the surface. On the northern steep slope of Mt Pliš (just above the quarry) *V. collina* was found in closed rocky grassland under a *Pinus nigra* plantation. Accompanying species in the herb layer were *Anthericum ramosum* L., *Carex humilis*, *Daphne cneorum*, *Hierochloë australis* (Schrad.) Roem. et Schult., *Inula hirta* L., *Mercurialis ovata*

Sternb. et Hoppe, *Peucedanum cervaria*, *Phyteuma orbiculare* L., *Rosa pimpinellifolia* L., *Veratrum nigrum* L., etc. A few specimens of *V. collina* were also found on the southern slope of the neighbouring Mt Mališćak, where the species occurred in a clearing of an oak forest with *Carex humilis* dominance in the herb layer. This, for the species rather unusual, xeric habitat was characterized by the presence of *Alyssum montanum* L., *Genista pilosa* L., *Hippocrepis comosa* L., *Potentilla cinerea* Chaix ex Vill., *Scorzonera austriaca* Willd., *Stachys recta* L., *Teucrium chamaedrys* L., *Thymus praecox* Opiz and *Viola hirta*.

In the Kalnik mountains (Stari grad and Mt Vranilac) *V. collina* was found mostly in the calcareous rocky forests on the steep northern slopes of the mountain range (to a lesser degree on the ridge itself) characterized by *Fagus sylvatica*, *Fraxinus ornus*, *Prunus mahaleb* L., *Sorbus aria* agg. and *Tilia* spp. These forests have preserved such montane species as *Arabis alpina* L., *Calamagrostis varia*, *Cirsium erisithales*, *Daphne mezereum* L., *Laserpitium siler*, *Moehringia muscosa* L., *Phyteuma orbiculare*, *Prenanthes purpurea* L., *Primula auricula* L., *Saxifraga paniculata* Mill., *Sesleria kalnikensis*, *Valeriana tripteris* L., etc.

### Notes on habitat preference of *Viola collina* in Croatia

From an ecological point of view the Croatian habitats of *V. collina* coincide well with central European records (GAMS, 1926; MEUSEL *et al.*, 1978). In all discovered Croatian localities *V. collina* grows in semi-shaded habitats on calcareous bedrock. According to BOUBLIK *et al.* (2007) *V. collina* is one of the diagnostic species of the dry calcicolous beech forest association on rocky outcrops (*Cephalanthero-Fagetum*). In the Alps it occurs in *Pinus* forests of calcareous rocky habitats (TOMAŽIĆ, 1940; WENDELBERGER, 1963; STROBL, 1989).

Regarding the habitat preference of *V. collina*, obvious similarities can be recognized between its Croatian and Hungarian localities. BAUER & MÉSZÁROS (2000) considered *V. collina* a typical *Cephalanthero-Fagenion* species. They found that in the Bakony mountains *V. collina* prefers *Fago-Ornetum* and *Festuco pallenti-Brometum pannonicum* associations, which are developed mainly on the northern dolomite rocky slopes of the Hungarian Transdanubian mountains. As was pointed out by ZÓLYOMI (1958, 1987), these associations have an outstanding role in preserving glacial relict species, such as *Calamagrostis varia*, *Moehringia muscosa*, *Phyteuma orbiculare*, *Primula auricula* and *Saxifraga paniculata*. The existence of direct successional relations between *Bromus pannonicus/Sesleria budensis (sadleriana)* grasslands and *Fago-Ornetum* karst forests was already emphasized by ZÓLYOMI (1958). In our opinion, the Croatian *Seslerietum* and the Hungarian *Festuco pallenti-Brometum pannonicum* (and *Seslerietum*) associations, furthermore the karst forests observed in the Kalnik and Papuk mountains and those of the Hungarian Transdanubian mountains (*Fago-Ornetum*) can be considered as geographically vicariant plant associations, respectively. It is very probable that their present species composition and structure can be attributed to similar successional histories from the early postglacial stage.

With respect to the distribution and habitat preference of *V. collina* in central Europe, this species should be considered a relict of a former cold epoch and thus has great phytogeographical significance in our region.

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