

Reseda inodora Rchb., a new species of the Croatian flora

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A population of *Reseda inodora* Rchb. was found in Bansko brdo (Baranya, Croatia), in April 2007. This Pontic-Pannonian species was not previously included in the recent Croatian botanical database. The chorology of *R. inodora* seems to be important, because this finding is on the western border of the species area. Considering the low number of individuals and small extension of occurrence, *R. inodora* should be treated as a critically endangered species in Croatia. A phytocoenological relevé taken on its habitat, a short morphological description of *R. inodora* and a new key of *Reseda* L. species of Croatia are presented.

Keywords: *Reseda inodora*, flora, loess, Baranya, Croatia

Introduction

Reseda inodora Rchb. (syn.: *R. mediterranea* Sadler non L.) is a lowland-collin, Pontic-Pannonian flora element (JÁVORKA 1925, SOÓ 1968, SIMON 1992) which occurs in Serbia (GAJIĆ 1972), Bulgaria (DELIPAVLOV 1984) and rarely in Hungary (SOÓ 1980, SIMON 2000, BARINA 2006). It is distributed from the Volga River around the Black Sea through the Balkan Peninsula to North Italy, but its area is very disjunct (YEO 1964). *R. inodora* is absent from the actual national database of the Croatian flora (NIKOLIĆ 1997, 2007), the Red Book of vascular flora of Croatia (NIKOLIĆ and TOPIĆ 2005), nor can it be found in the identification handbooks of Croatia (DOMAC 1984, 2002). The occurrence of this species in Croatia was mentioned in some works (JÁVORKA 1925, RAUŠ and ŠEGULJA 1983), but it has not been proved previously.

Reseda inodora is a biennial or perennial vascular plant with the height of 20–60 cm. Stems are erect, sometimes branched from the bottom (bushy). Leaves are lanceolate, erect, spatulate at the base, while some of the upper are pinnate with 1–2 pairs of lateral

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lobes and a large terminal lobe. Bracts are 3 mm long. Each flower has a 5–8 mm long pedicel. Flowers are hexamer. The length of green sepals is about 5 mm, while white petals are shorter, app. 3 mm. Limbs of petals are sessile, digitate with 11–17 linear oblanceolate segments (JÁVORKA 1925, YEO 1964, SIMON 2000). Stamens are usually orange (brown-red). Capsules are erect or nodding (Fig. 1. a, b). *R. inodora* is a therophyte or hemicryptophyte species, flowering from June to August in Hungary.

Reseda inodora is very similar to *R. odorata* L., an adventive and cultivated reseda which is not an ancient element of the European flora (YEO 1964). Nevertheless, they differ from each other considerably in the width of the fringes of lobes on the petals, the width of the sepals that are wide in their upper part and narrow at their base in the case of *R. odorata* and uniform on *R. inodora*. The capsule of *R. inodora* is ovate while it is obovate in the case of *R. odorata*.



Fig. 1. a, b *Reseda inodora* Rchb. on a loess wall in Bansko brdo (Photo: János CSIKY)

Focusing on the Carpathian Basin, *Reseda inodora* is a rather rare and actually endangered species in Hungary, absent from Austria (ADLER et al. 1994), Slovakia and the Czech Republic (DOSTÁL and ČERVENKA 1991, ČEROVSKÝ et al. 1999, FERÁKOVÁ et al. 2001), existing in Romania and Serbia, where it is not even threatened (SERBANESCU 1955, YEO 1964, STEVANOVIĆ 1999). This species occupies open, dry, steep habitats on loess substrates in Hungary (MOLNÁR 2006). The syntaxonomical preference of *Reseda inodora* is not supported by relevés in Hungary, but it is considered as a *Festucion rupicolae* Soó 1940 corr. 1964 taxon (Soó 1980, BORHIDI 2003). SIMON (1992) treated it as a weed species, while BORHIDI (1993) emphasised its specialist character. *R. inodora* was not mentioned in the last Hungarian Red Book (NÉMETH 1989) and is not protected in Hungary (FARKAS 1999, 23/2005. (VIII. 31.) KVM.: laws and decrees referring the protected species in Hungary).

Material and methods

For determination of plant species the authors used the current Hungarian (SIMON 2000) and Croatian (DOMAC 1984, 2002) handbooks. KASZAB (1962) was used for identification of herbivorous insects. According to the Central European Flora Mapping System (NIKOLIĆ et al. 1998) we compiled the distribution map of *R. inodora* in Croatia. In the habitat of the species phytocoenological relevés were taken according to the Braun-Blanquet methodology (MUELLER-DOMBOIS, ELLENBERG 1974). BORHIDI (2003) was used for the identification of vegetation types. For classification of *Reseda inodora* into IUCN red list categories the authors used criteria after NIKOLIĆ (2005). Examples of plants have been collected and deposited in the Herbarium in Zagreb (ZA). Site geocoding was done by GPS device.

Results

Surveying the loess flora and vegetation of BANSKO BRDO (NE Croatia) from Zmajevac to Batina 7 individuals of *R. inodora* were recorded in the 0178/4 Central European Flora Mapping quadrat (Fig. 2).

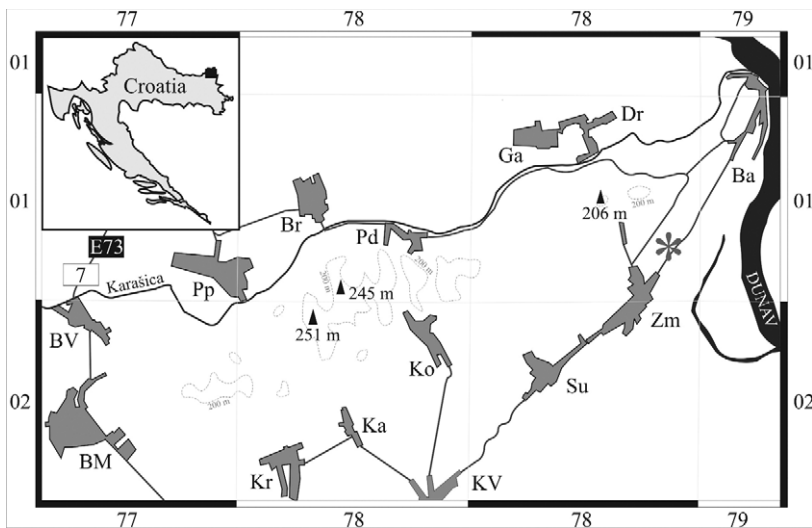


Fig. 2. Distribution of *Reseda inodora* Rchb. in BANSKO BRDO (Croatia). »*« means: 5796977, 5081091 (Gauss-Krüger coordinates). Grid: Central European Flora Mapping System. Abbreviations: **Ba**: Batina; **BM**: Beli Manastir; **Br**: Branjina; **BV**: Branjinski Vrh; **Dr**: Draž; **Ga**: Gajić; **Ka**: Kamenac; **Kr**: Karanac; **Ko**: Kotlina; **KV**: Kneževi Vinogradi; **Pd**: Podolje; **Pp**: Popovac; **Su**: Suza; **Zm**: Zmajevac (drawn by János CSIKY and Toni NIKOLIĆ)

BANSKO BRDO (Banska kosa) is an elevation consisted of loess sediments (243 m a.s.l.), 21 km long, stretching in the NE-SW direction (BOGNAR 1990). Its south-eastern part is sheer, 25–58 m high loess cliff, facing the Danube floodplain. A small population of *R. inodora* in BANSKO BRDO occurs on these steep slopes (Fig. 3. a, b). In consequence of the high value of inclination, the precipitation can not wet the surface enough. These cliffs are

exposed to sunshine (irradiation) and desiccating winds and are in consequence extremely hot and dry on the summer time, cold and dry in the winter, so they function as extrazonal semi-deserts and orographic deserts in the zone of the closed oak forests and forest steppes (Pócs 1999).

Most of the individuals were flowering from April to May in 2007 in Bansko brdo, rather earlier than the average in Hungary (Soó 1968, SIMON 1992). All of the individuals were infected by a small herbivorous insect *Phyllotreta nodicornis* (Marsham 1802) which feeds on the leaves of this plant without destroying it.

As the earlier identification handbooks do not contain this species, the authors created a new *Reseda* L. key for Croatian area:

- 1.a Upper leaves usually entire 2
- 1.b Upper leaves usually ternate or pinnatifid 3
- 2.a Petals yellow, 4–8 lobed, sepals and petals 4. Capsule shorter than 6 mm, erect. Flowers in narrow, dense, racemose inflorescence. Seed smooth, shiny. Biennial, glabrous, erect, 80–150 cm. **R. luteola** L.
- 2.b Petals white, lobes fringed, sepals and petals 6. Capsule longer than 10 mm, nodding. Flowers in loose, racemose inflorescence. Seed rough, matt. Annual, biennial 10–40 cm, with ascending branches near the base. **R. phyteuma** L.
- 3.a Upper leaves with 5–15 leaf-lobes on each side. Petals 5(–6), white, lobes 3–5. Flowers in dense, racemose inflorescence. Annual to perennial 30–80 cm, erect, branching **R. alba** L.
- 3.b Upper leaves with 1–4 leaf-lobes on each side, sepals and petals 6 4
- 4.a Petals yellow, lobes 3. Capsule erect. Seed smooth, shiny. Leaves mostly pinnatifid, with 1–4 pairs of pinnae. Annual to perennial 30–80 cm, bushy. **R. lutea** L.
- 4.b Petals white, lobes fringed. Orientation of capsule variable (erect or nodding). Seed rough, matt. Upper leaves usually ternate. Biennial or perennial 20–60 cm, erect, branched below **R. inodora** Rchb.

In order to establish its phytocoenological character one relevé was taken by the authors. Open loess wall vegetation (*Agropyro cristati-Kochietum prostratae* Zólyomi 1958), Relevé made by: János CSIKY and Dragica PURGER, Date: 2007.04.21., Location: Croatia/ Zmajevac (on loess wall), Position (Gaus-Krüger coordinates): 5796977, 5081091, Altitude: 93 (+/– 7) m, Plot size: 4 m², Exposition: 90°, Declination: 60°, Cover total: 7%, Cover E1: 7%, Cover bare loess: 93%, Height E1: 60 cm, Cover abundance scale: »Braun-Blanquet old«;

Artemisia campestris: 1, *Reseda inodora*: +, *Sisymbrium orientale*: +, *Erodium cicutarium*: +, *Euphorbia helioscopia*: r, *Agropyron pectinatum*: r, *Chenopodium album*: r, *Ballota nigra*: r, *Lappula squarrosa*: r, *Papaver dubium*: r.

The species occurring in the habitat of *R. inodora* are heliophilous and xerotolerant plants. Some of them are common weedy herbs (e.g. *Chenopodium album*, *Convolvulus arvensis*, *Setaria verticillata*), while others are rare submediterranean and subcontinental species (e.g. *Erodium ciconium*, *Iris pumila*, which are not presented in the relevé above, but do exist in the same stand). The habitat type of *Reseda inodora* is extremely restricted in Croatia, the extent of its occurrence being less than 10 km². The number of adult individuals in the population is less than 50. Based on these two criteria *Reseda inodora* should be treated as a critically endangered (CR) species of the Croatian flora (NIKOLIĆ 2005).



Fig. 3. a,b Habitat of *Reseda inodora* in Bansko brdo, near Zmajevac (Photo: János CSIKY)

Conclusion

According to the literature and the current database of Croatia (NIKOLIĆ 2007) *Reseda inodora* Rchb. can be recognised as a new taxon of the Croatian flora. The new site is on the western border of its distribution area. This species is a typical loess wall plant (*Agropyro cristati-Kochietum prostratae* Zólyomi 1958) in Croatia as well as in Hungary. Considering the low number of individuals and small extent of occurrence, *R. inodora* should be treated as critically endangered species in Croatia.

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