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The current status of *Centaurea immanuelis-loewii (Compositae)* in Bulgaria

Abstract

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The chorology and some aspects of the ecology of *Centaurea immanuelis-loewii*, a rare endemic of S.W. Bulgaria and N.E. Greece, are discussed. New data on structure and density of its populations and on the surrounding vegetation are presented.

Introduction

Centaurea immanuelis-loewii Degen is a Balkan endemic species with very restricted distribution. It is included in the list of rare, threatened and endemic species of Europe (Lucas 1983) as well as in the Red Data Book for Bulgaria (Velčev & al. 1984: 337). *C. immanuelis-loewii* is protected by law in Bulgaria, being qualified as a very rare and insufficiently studied species of the Bulgarian flora (Kuzmanov 1978). Some of the chorological data for Bulgaria that are cited in the literature are inaccurate. These inaccuracies prompted our interest in this species.

Methods

Analyses were made of the population density, soil characteristics, and the surrounding vegetation. We concentrated on the two largest Bulgarian populations, growing near the towns of Kresna and Sandanski (Sveti vrac). The quantitative evaluation of the populations was made on the basis of randomly spread sample areas of 1 m^2 each. On the territory of Kresna 50 such sample areas were used, while at Sandanski because of the lower population density the number was raised to 150.

Soil characteristics were analysed following the methods described by Arinuškina (1961).

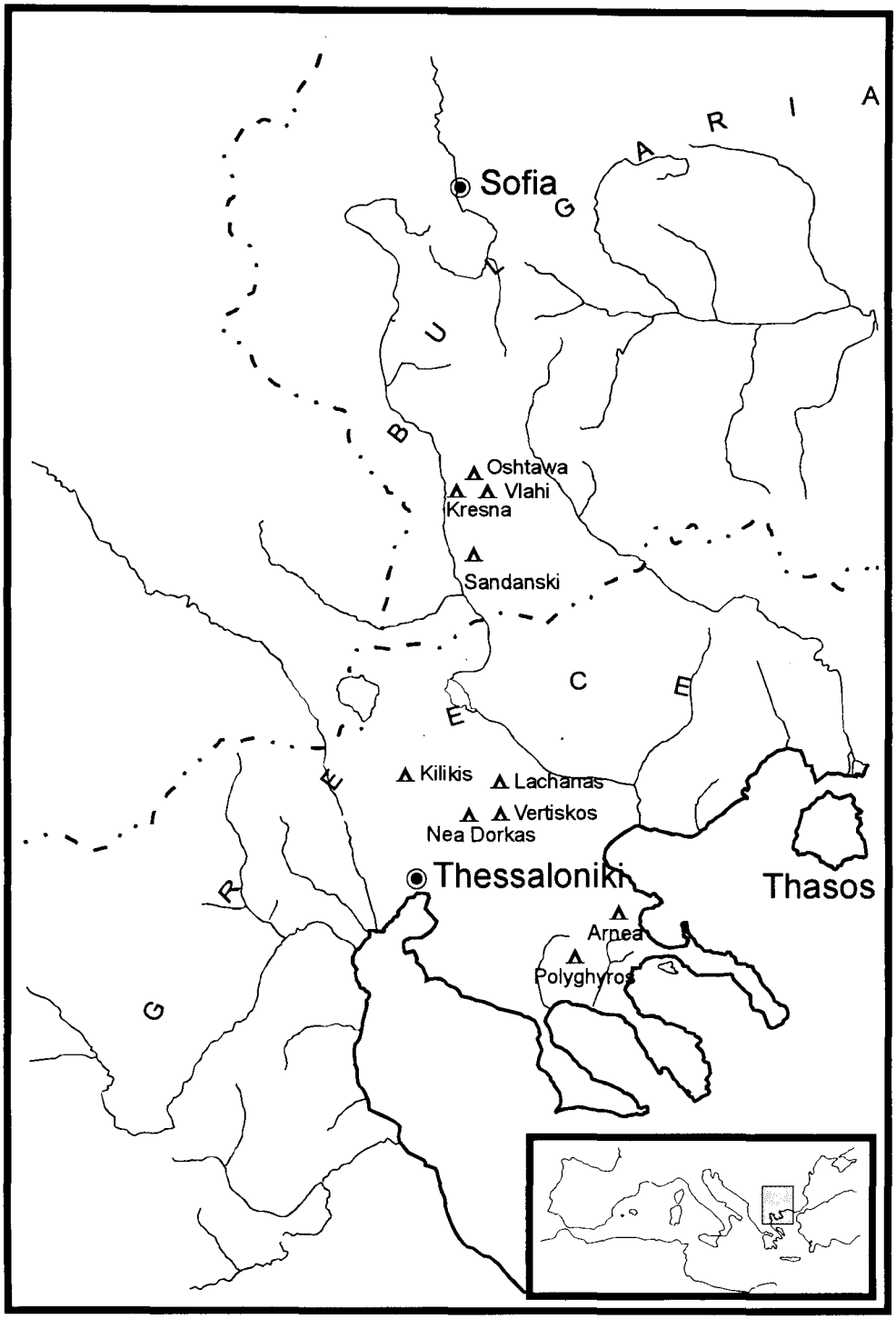

Fig. 1. The total known distribution of *Centaurea immanuelis-loewii*.

Chorological data

Centaurea immanuelis-loewii was described by Degen (1917) on the basis of 18th Century collections from N. Greece, in the regions of Mts Athos and Holomondas as well as between Thessaloniki and Serres.

In Bulgaria, *Centaurea immanuelis-loewii* was first found by Stojanov (1921) near the town of Sandanski, but no herbarium materials were then deposited. The oldest known Bulgarian herbarium specimen is from Sveti vrac (Sandanski), in the valley of the river Bistrica, at 200-300 m (1 Jul 1938, *?Penzes,* BP; n.v., fide Wagenitz & Gamal-Eldin 1985). The existence of the species in Bulgaria was not confirmed until 1982, when a new locality of was found by Denchev in the Pirin mountains (Denčev & Kožuharov 1987; SOM No. 143615). In 1983 the species was found in the same region at lower altitude, near the town of Kresna, again by Denchev (SO No. 92060, 92061, 92062) and by Kuzmanov (SOM No. 144145, 145131, 144522). A herbarium specimen (SO No. 91117) collected near the town of Sandanski by D. Stojanov in 1982 and initially identified as *"C. salonitana* var. *purpurea"* also turned out, after revision, to belong to *C. immanuelis-loewii.* In 1992 the species was found in two places north of Kresna, near the village of Oštawa (M. Ančev, pers. comm.) and along the river Vlahina in the natural reserve "Tissata" (V. Velčev, pers. comm.). In 1993 we found it on the low hills east of the town of Sandanski, probably in the very place where it had first been noted by Stojanov (1921).

All Bulgarian localities are situated in the south-western part of the country, in the Struma valley – a region that is strongly influenced by the Mediterranean climate.

Stojanov & Stefanov (1924-1925) added "Melnik district" after the only then known Bulgarian locality. In the following three editions of their *Flora of Bulgaria,* this indication remained but the name of the actual locality was omitted, which gives a wrong idea of the Bulgarian distribution of the species. There are many biotopes suitable for the species in the surroundings of the town of Melnik, but all our searches in that region were unsuccessful. In their *Atlas of the endemic plants in Bulgaria,* Velčev & al. (1992: 165) erroneously indicated the towns of Goce Delčev and Melnik as localities of the species. Kuzmanov (1978) gives the distribution of the species outside Bulgaria as "Yugoslavia" instead of Greece – an obvious slip of the pen, as there are no data so far on the presence of *Centaurea immanuelis-loewii* on the territory of former Yugoslavia.

The total distribution of the taxon is mapped in Fig. 1. Chorological data for Greece are from Routsê (1993).

Notes on ecology

All Bulgarian populations are found on strictly south- to south-west-exposed slopes, at altitudes of 300-900 m. Probably because of its low competitive ability the species colonizes very steep slopes (up to 80°) where few other species can survive. The substrate is acidic non-calcareous, dry and bare sandstone, with the following chemical characteristics: pH = 8.5; humus ≤ 0.43 %; N ≤ 0.02 %; K(K_2O) = 19.0 %; Na (Na_2O) = 17.8 %; P (P_2O_5) = 0.17 %.

The population in the vicinity of Kresna covers about 10 ha. One can distinguish to two types of habitats within this area: a northern portion with steeper slopes and a thinner

plant cover, and southern portion of low hills. In the northern part, *Centaurea immanuelis-loewii* occurs in 81 % of the sample squares, but in the southern part only in 33 %. Average population density in the northern part is 4.8 individuals per m^2 (2.1 juvenile, 2.7 mature), on the southerly hills it is 1.1 individuals per m^2 (0.3 juvenile, 0.8 mature).

Near the town of Sandanski, the habitat of the population is more homogenous. Its area is about 2 ha. The species occurs in 20 % of the sample squares. The estimated population density is 0.3 individuals per m^2.

As one might expect, population density depends on the vegetation cover. The more uneven the vegetation, the more favourable are the conditions for the growth of *Centaurea immanuelis-loewii*.

Centaurea immanuelis-loewii is a component of a very open, xerothermic type of vegetation, dominated by *Juniperus oxycedrus* L., *Chamaecytisus supinus* (L.) Link, and *Artemisia campestris* L. Associated species are *Achillea chrysocoma* Friv., *Astragalus pugionifer* Fisch. ex Bunge, *Bromus tectorum* L., *B. riparius* Rehmann, *Dianthus roseoluteus* Velen., *Hypericum rumelicum* Boiss., *Koeleria penzesii* Ujhelyi, *Limonium vulgare* subsp *serotinum* (Rchb.) Gams, *Onobrychis lasiostachya* Boiss., *O. arenaria* (Kit.) DC., *Scabiosa rotata* M. Bieb., *Silene italica* (L.) Pers., *S. dichotoma* Ehrh., *Sedum album* L., *S. sartorianum* Boiss., *Trifolium ochroleucon* Huds. subsp *ochroleucon*, *Thymus atticus* Čelak., *Vulpia muralis* (Kunth) Nees, etc.

Plants in the Kresna population are often infected by *Puccinia calcitrapae* DC. (II+III, SOM No. 20992-M). *Centaurea immanuelis-loewii* is a new host for this rust fungus.

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