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Loiseleuria procumbens: differentiation of the seed size of some chosen European populations

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Abstract: *Loiseleuria* is a monotypic genus of the family Ericaceae. The only species of this genus, *L. procumbens*, is an arctic-alpine element with a circumpolar distribution, found in the subarctic zone and in mountain ranges located further south. Results of earlier research on the structure of its fruits and seeds (Szkudlarz 2002) suggested that there are some differences between populations from different parts of its natural range of distribution. To verify this hypothesis, seed dimensions in samples from distant localities were compared in this study. The presented results indicate that in populations from Scandinavia seeds are generally shorter than in central Europe.

Additional key words: Alpine azalea, length and width of seed, distribution, variation

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Introduction

Loiseleuria procumbens (L.) Desv. (1813) is the only member of the genus. It is assigned to the tribe *Phyllodoceae*, subfamily *Rhododendroideae*, family *Ericaceae* (Stevens 1971, Takhtadzhyan 1987). Synonyms: *Azalea procumbens* L., *Rhododendron procumbens* Wood, Chamaeledon procumbens Link, *Chamaecistus procumbens* Kuntze.

L. procumbens is an evergreen dwarf shrub with thin, decumbent shoots. Leaves opposite, elliptic to oblong, with rounded apex and cuneate base. Petiole short, so leaves are nearly sessile. Leaf blades 3–8 mm long, 1–2.5 mm wide. Leaf upperside coriaceous, smooth, with strongly revolute margins, while underside densely hairy (except for midrib). Clusters of 2–5 flowers each are located at shoot tips. Flowers 5–merous. Sepals free, reddish, 2–3 mm long. Corolla pink (rarely white), bell-shaped; petals fused at base, 4–5 mm long. Stamens 5, shorter than corolla. Pistil 1, ovary superior, style straight, with stigma capitate (Poyarkova 1952, Zarzycki 1963, Webb 1972). Fruit rounded, septi-loculicidal capsule, dehiscing both along septa and halfway between them (Szkudlarz 2002), 3–4.5 mm across.

Because of its distribution, this species is classified as amphiarctic-alpine (Zarzycki 1963), amphi-Atlantic (Hultén and Fries 1986) or arcto-alpine (Poyarkova 1952). Its natural range is circumpolar, including northern parts of North America, Greenland, northern Asia and northern Europe (Iceland, Scotland, Scandinavia). Additionally, it occurs in mountains of central and southern Europe (Pyrenees, Alps, Carpathians, northern part of the Balkan Peninsula), forming isolated populations there (Meusel et al. 1978, Hultén and Fries 1986, Čeřovský et al. 1999) (Fig. 1). During research on morphology and anatomy of fruits and seeds (Szkudlarz 2002) the differentiation in the size of seeds coming from various sites was noted. Therefore, the major aim of the presented

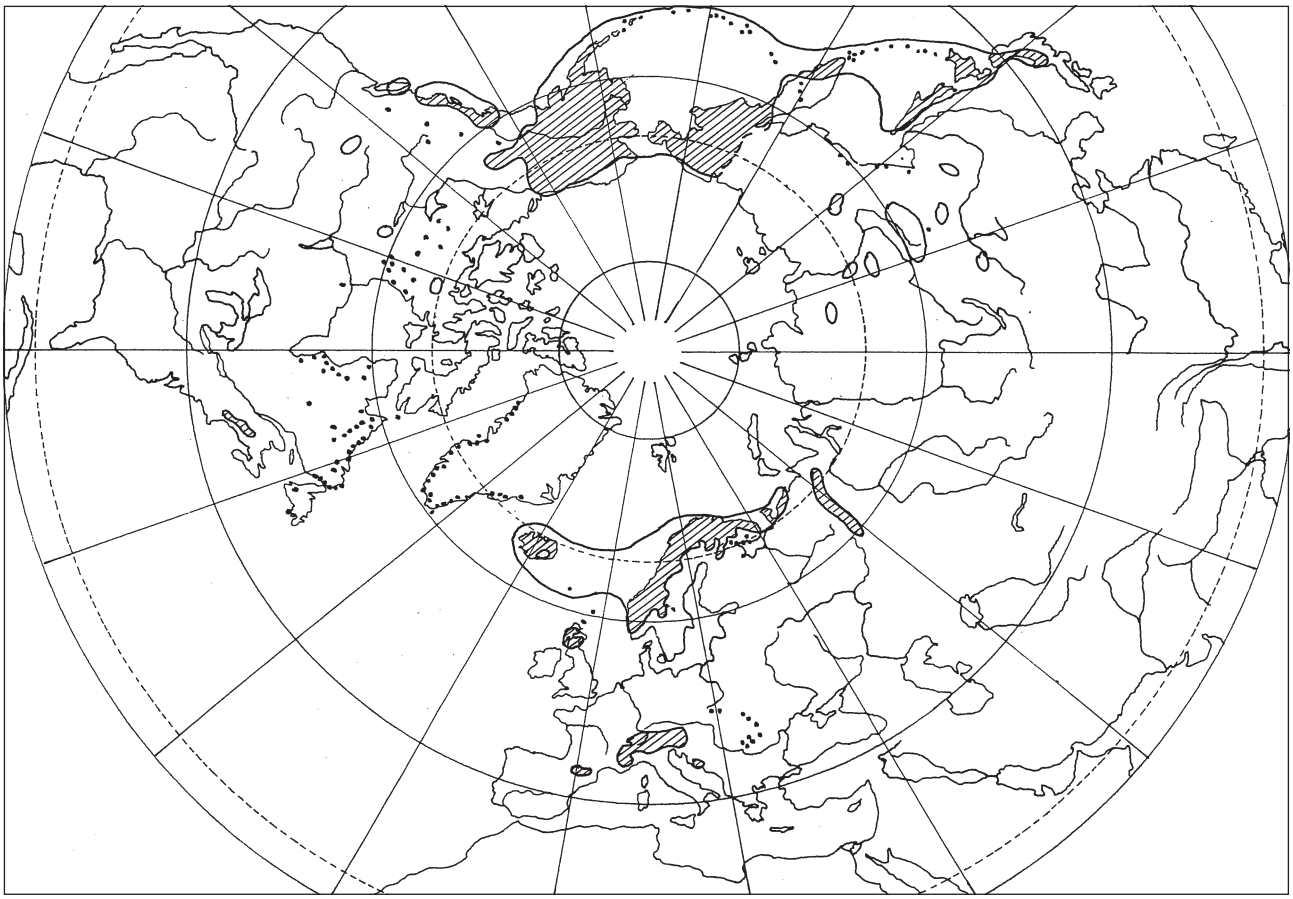

Fig. 1. The natural range of the *Loiseleuria procumbens* (according to Meusel et al. 1978)

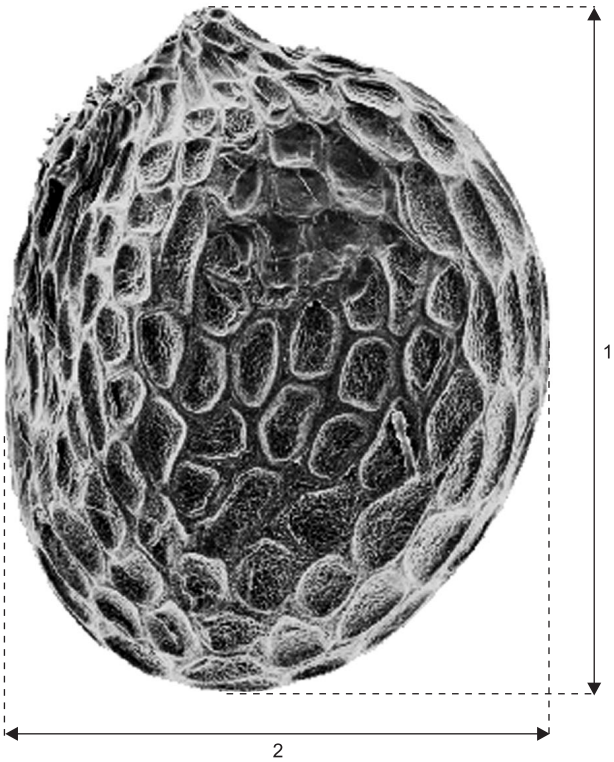

Fig. 2. Method of measuring the seeds: 1 – length of seed, 2 – width of seed

work was to carry out biometrical studies on the seeds of this species and to describe the scale of variability of some chosen features.

Material and methods

The size of seeds of *Loiseleuria procumbens* was the subject of this study. Seed samples were collected in 4 localities: (1) on the river Lemmenjoki in northern Finland, about 20 km SW of Lemmenjoki village, Gaskoaivi hill, 18.08.2000; (2) in the Khibiny Mts in the Kola Peninsula in Russia, about 10 km N of Kirovsk, 27.08.99; (3) in the Hohe Tauern Mts in the Austrian Alps, near Margaritze lake, 16.09.99; and (4) in the Pyrenees in Andorra, 2001. Each sample consisted of 35 ripe seeds. Seed length and width were measured under a stereoscopic microscope MST 132 with the use of the Lucia Screen Measurement G software (Fig. 2). On the basis of the obtained measurements the statistical characterization of the samples has been work out (arithmetic means (x), standard deviations (SD) and variability coefficient (V)).

Results

The statistical analysis of collected data resulted in a very interesting image of variation in seed dimen-

sions of *L. procumbens* (Table 1). Seeds from northern limits of Europe (river Lemmenjoki in Finland and the Kola Peninsula in Russia) are significantly smaller than those coming from high mountains of central Europe (Alps and Pyrenees). The differences concern primarily seed length, as shown in Figures 3 and 5. Fig. 3 is a polygon diagram of seed length in the studied samples. In the Pyrenean population, 50% of

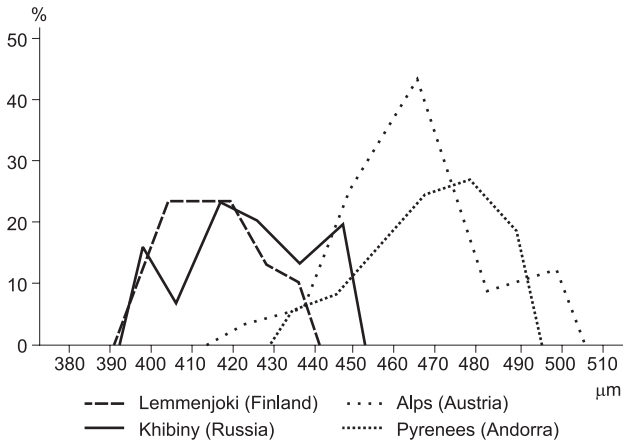

Fig. 3. Variability polygon of seed length

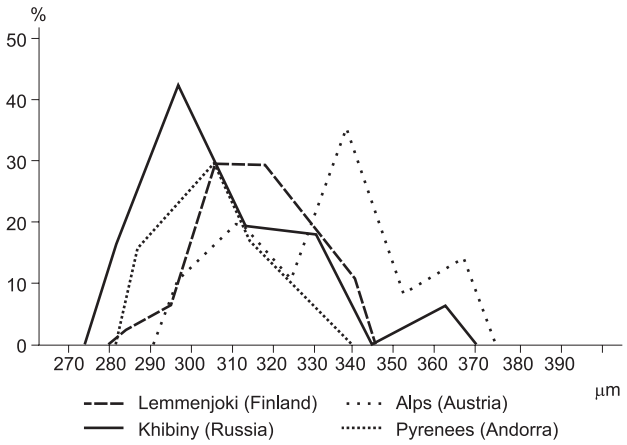

Fig. 4. Variability polygon of seed width

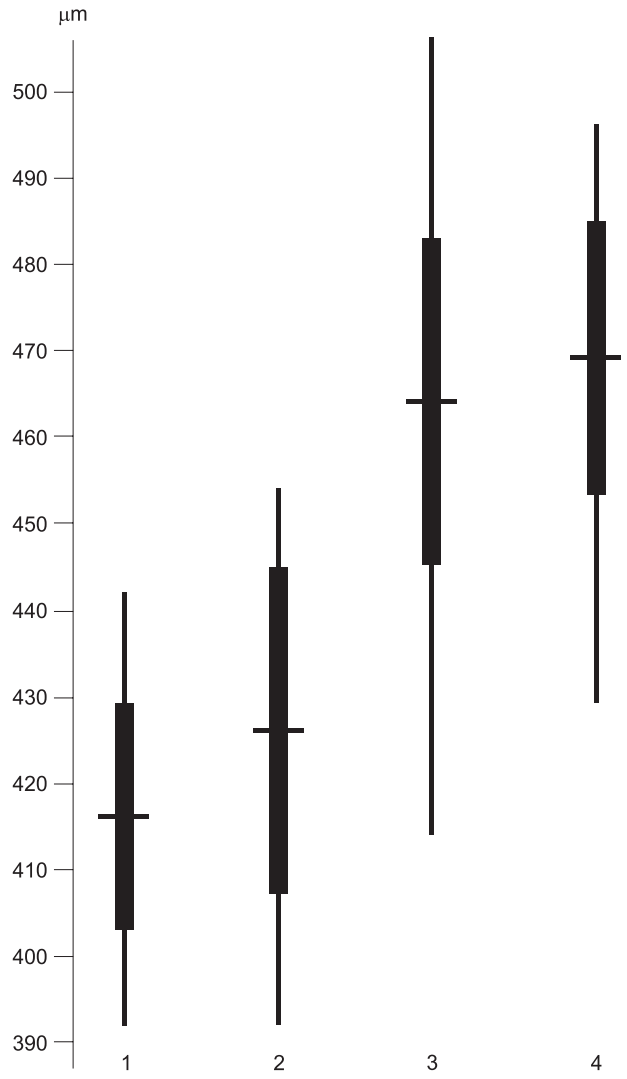

Fig. 5. Main statistics of the studied samples: range of seed length (thin, vertical line), mean value (thin horizontal line), standard deviation (thick vertical bar)

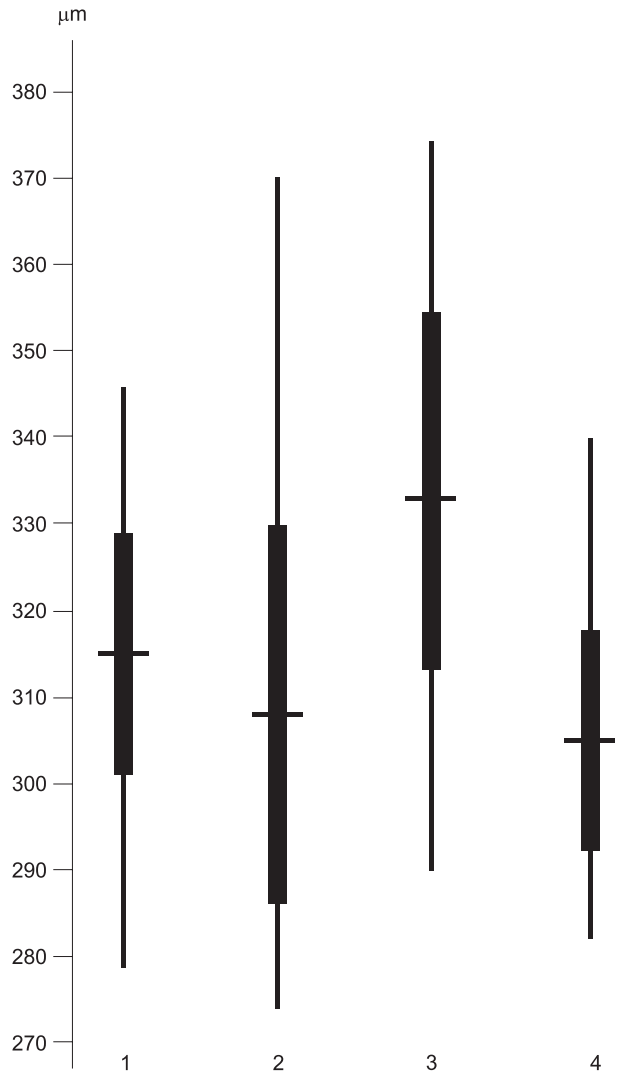

Fig. 6. Main statistics of the studied samples: range of seed width (thin, vertical line), mean value (thin horizontal line), standard deviation (thick vertical bar)

Table 1. The main statistics of the studied samples: arithmetic means (x), standard deviations (SD) and variability coefficient (V)

Samples	Length (μm)			Width (μm)		
	x	SD	V%	x	SD	V%
Lemmenjoki (Finland)	416	12,72	3,06	316	14,13	4,47
Khibiny (Russia)	427	17,96	4.21	308	22,56	7,32
Alps (Austria)	464	18,86	4,06	332	21,50	6,47
Pyrenees (Andorra)	469	16,47	3,51	305	13,52	4,43

seeds are 462–483 μm long, and in the Alpine population 50% of seeds are 445–475 μm long. For northern populations, the values are much lower, as 70% of seeds in the sample from Lemmenjoki are 404–425 μm long, and 50% from Khibiny are 412–433 mm long. Fig. 5 presents the main statistics of the studied samples: range and mean value (x) of seed length in each sample, and standard deviation (SD). The range x±SD containing about 66% of the studied sample, is considered characteristic for the sample. A clear hiatus can be observed between the characteristic ranges for samples from northern Europe and central Europe. The seed width don't show this differentiation (Figs. 4 and 6).

Discussion

Although seed length ranges for the studied samples overlap, their characteristic values (x±SD) are clearly distinct, forming two separate groups. Until now, there has not been given any information in the literature, concerning taxonomic differentiation of *L. procumbens* (Hultén and Fries 1986, Poyarkova 1952, Webb 1972, Villar 1993, Mabberley 1997). Accepting, that generative organs, including seeds, belong to the organs with relatively constant features, the fact of the existence of some discontinuity in the length of the seeds can be recognized as a symptom of the internal differentiation of this species. Such a variation is highly probable, considering the huge natural range of *L. procumbens* and the fact that the northern samples represent the continuous range of distribution, while the southern populations are isolated, probably since the end of the Ice Age. In the time of glaciations this species was an element of the flora of arctico-mountain tundra which, when the climate grew warmer, retreated northwards, leaving range islands in the higher levels of mountains.

The presented results are evidence of intraspecific variation within *L. procumbens*. However, more detailed investigations are needed to confirm the hypothesis and resolve any doubts concerning this problem.

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