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Communication

# Rediscovery of endangered species *Laphangium luteoalbum* (Asteraceae) in Lithuania

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**Abstract**

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*Laphangium luteoalbum* (Asteraceae) is a widely distributed species native to Eurasia; however, it is rare or endangered in some regions of Europe and included into the lists of protected species. In Lithuania, *Laphangium luteoalbum* was recorded in the southern part of the country, mainly along the banks of the Nemunas River in the 20th century. In contrast, it was found only in the 19th century in the western part of the country. During the research in Curonian Spit National Park (Neringa, western Lithuania), a relatively large species population was found in the transition zone between the dune grassland and wet dune slack habitats. The total population in 2020 consisted of about 500 individuals distributed over an area of about 310 $m^2$. We assume that the seeds of this wind-dispersed plant may have been transferred from other regions of Europe by the wind. However, it cannot be excluded that the plants found are descendants of populations previously recorded in the country. The species is most threatened by the loss of wet, open sandy habitats due to eutrophication of water bodies and subsequent changes in bank vegetation. *Laphangium luteoalbum* was classified as data deficient (DD) in the last assessment according to the IUCN criteria. Still, a reassessment based on the current data indicates that the species should be considered critically endangered (CR) in Lithuania.

**Keywords**: annual plant, conservation, *Gnaphalieae*, habitats, IUCN, threats; wind-dispersal.

## INTRODUCTION

The diversity of plant species in any given area is a system that varies over time and space. Native plant species, let alone alien plant species, begin to spread, take over new areas and habitats due to the influence of various factors, or, on the contrary, decline and become very rare or even extinct (Parmesan & Yohe, 2003; Thomas et al., 2004). Changes in the dominance, abundance and frequency of native species, caused by strong anthropogenic pressures and climate change, have been particularly evident over the last decades (Thuiller et al., 2005; Moritz & Agudo, 2013; Attore et al., 2018).

Several plant species in Lithuania have been recorded in the country at various times but have not been found in recent decades and are considered regionally extinct. Some species such as *Caldesia parnassifolia* (L.) Parl., *Elatine hydropiper* L., *Hydrocotyle vulgaris* L., *Veratrum album* L. have not been recorded in the country for several decades or even more than half a century (Rašomavičius, 2007, 2021; Sinkevičienė, 2016; Gudžinskas & Taura, 2021; Taura et al., 2022). For several other rare and protected species, the status of their populations has been unknown for several decades, and searches for them have been unsuccessful. One such species is *Laphangium luteoalbum* (L.) Tzvelev, whose population sta-

tus has not been known for decades. It is assessed as data deficient (DD) in Lithuania's List of Protected Species (Rašomavičius, 2021). A new locality of *Laphangium luteoalbum* was recorded in the summer of 2020 in Neringa, in Curonian Spit National Park (West Lithuania). The rediscovery confirmed that the species is not yet extinct in Lithuania.

*Laphangium luteoalbum* L. (Asteraceae) is a widely distributed species native to Eurasia and introduced in North America, Australia and the Pacific islands (Hultén & Fries, 1986; Nesom, 2004; Greuter, 2006). This species is treated as native in most European countries; however, it is casual alien and doubtfully native in the Canary Islands (Greuter, 2006). In Lithuania, this species is at the northern border of its distribution area in East Europe, and it is absent in Latvia and Estonia (Kull et al., 2003). Although this species is widespread in much of Europe, it is rare or endangered in some regions and included into the lists of protected species (Wind et al., 1996; Hrčka, 2005; Rašomavičius, 2007; Turis et al., 2014; Cwener et al., 2016).

Although many taxonomic problems in the generic delimitations in the tribe *Gnaphalieae* Lecoq & Juillet have been recently resolved (Hilliard & Burtt, 1981; Anderberg, 1991; Greuter, 2003; Galbany-Casals et al., 2014), some controversies in their treatment remain. *Gnaphalium luteoalbum* L., as described by Linnaeus (1753), is currently treated as a member of the genus *Pseudognaphalium* Kirp. (Hilliard & Burtt, 1981; Nesom, 2004; Freire et al., 2015, 2018), *Laphangium* (Hillard & B.L. Burtt) Tzvel. (Greuter, 2003, 2006; Compositae Working Group, 2022), *Gnaphalium* L. (González-Perez et al., 2008) or *Helichrysum* L. (POWO, 2022). It has been established that *Laphangium luteoalbum* is not closely related to the members of the genus *Gnaphalium* s. str. but is much closer to the large and polymorphic genus *Helichrysum* L. (Hilliard & Burtt, 1981; Tzvelev, 1993; Greuter, 2003). Here we accept the taxonomic point of view supported by Greuter (2003, 2006) and treat it as a representative of the genus *Laphangium*. The same taxonomic viewpoint has been accepted in preparing the latest List of Protected Species of Lithuania (Įsakymas, 2020).

This study aimed to analyse historical information on the distribution of *Laphangium luteoalbum* in Lithuania and assess the size and status of the rediscovered population of this species and the need for conservation measures.

## MATERIALS AND METHODS

The *Laphangium luteoalbum* population was surveyed in August 2020. The species' habitat and status, composition of the community, the area covered by the population and the number of individuals were assessed. The area covered by the population was calculated from the results of measurements made in the wild with a measuring tape. The herbarium specimens collected during this research are stored in the Herbarium of the Botanical Institute of the Nature Research Centre (BILAS).

The literature sources were analysed, and the collections at the Herbarium of the Botanical Institute of the Nature Research Centre (BILAS) and Vilnius University (WI) were checked to assess the species' historical distribution. Historical place names used in the cited literature are given in square brackets next to the current place name. A map of the distribution of *Laphangium luteoalbum* was compiled by applying a grid system. All records made in the same grid cell were marked with a single symbol indicating the period of the last record. Assessment of the threat to *Laphangium luteoalbum* population in Lithuania was performed following the IUCN Guidelines and Criteria (IUCN, 2012) and based on the results of this study.

## RESULTS AND DISCUSSION

*Laphangium luteoalbum* has been considered a rare species in Lithuania during various historical periods (Kuprevičius, 1934; Snarskis, 1954, 1968; Lazdauskaitė, 1980; Kull et al., 2003; Rašomavičius, 2007). The analysis of historical information on the distribution of *Laphangium luteoalbum* in Lithuania revealed that this species had been found mainly on the banks of the River Nemunas and in the western part of the country since the first half of the 19th century (Fig. 1). In western Lithuania, in the vicinity of Kretinga [um Kretingen], *Laphangium luteoalbum* was found before 1830 (Gorski, 1830), and in Nemirseta (now a part of Palanga city) in 1848 [Mem. [el], List, 1848, b.[ei] Nimmersatt am Ostseebade] (Abromeit et al., 1898).

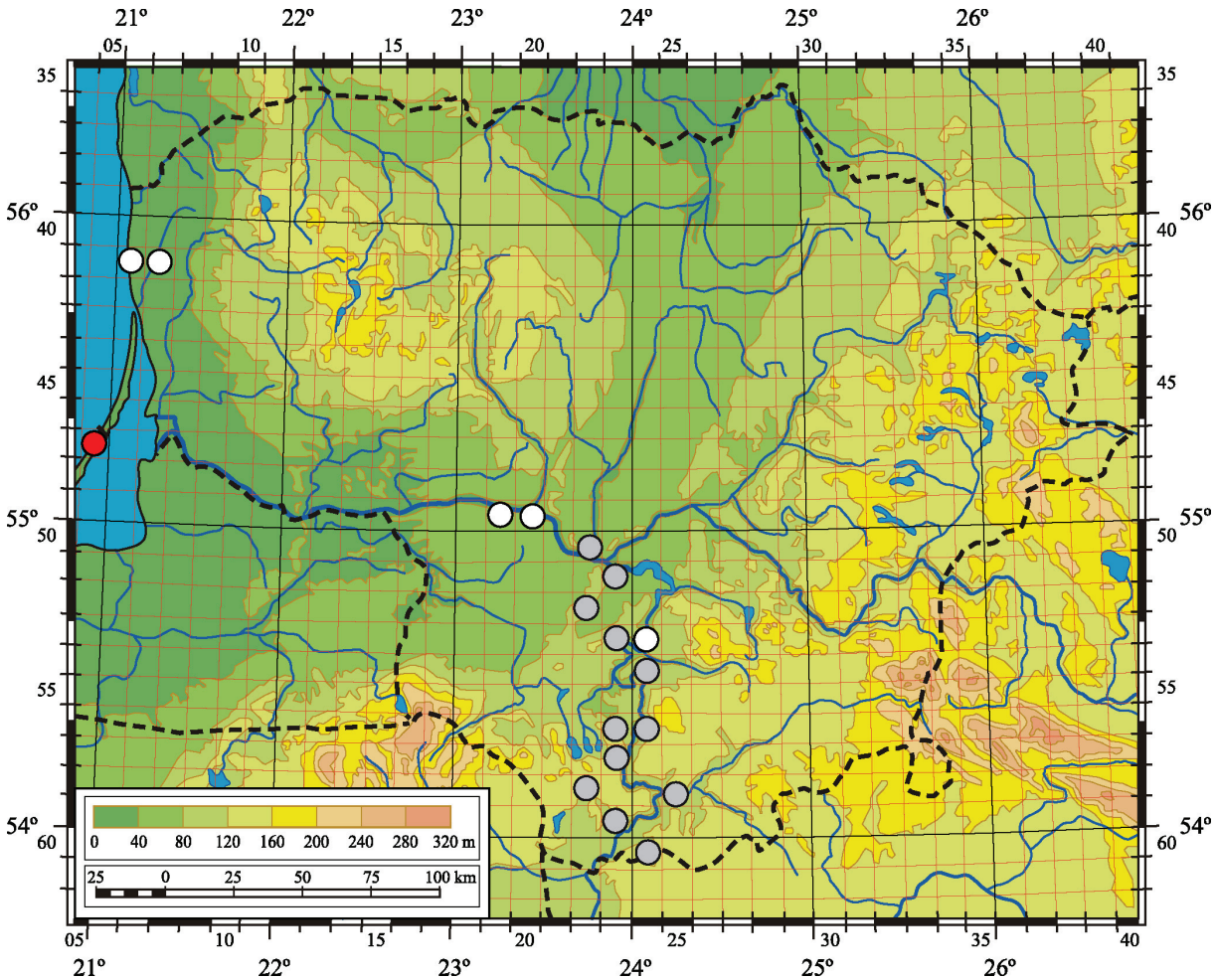


Fig. 1. Distribution of *Laphangium luteoalbum* in Lithuania. White circles indicate localities recorded in the 19th century, grey circles in the 20th century, and the red circle indicates the locality discovered in 2020

From the second half of the 19th century until 1940, the species was recorded along the banks of the middle reaches of the River Nemunas (Fig. 1). During this period *Laphangium luteoalbum* was recorded in Plokščiai [Błogosławieństwo], Žemoji Panemunė [Poniemuń dolne] (Drymmer, 1887), Kaunas [insula in fl. Niemen ad Kowno] (Möllendorff, 1902), Birštonas [pen. Birsztany] (Łapczyński, 1886) and Pabališkiai (now Prienai district) (Regel, 1931; Hryniewiecki, 1933).

After World War II, from 1946 to 1951, P. Snarskis recorded this species several times in the vicinity of Druskininkai and Kaunas (BILAS). In later periods, the plant was found on the banks of the River Nemunas in the southern part of the country (Rašomavičius, 2007). Still, the records made in the 1960s–1990s were not adequately documented and not confirmed with herbarium specimens. The abundance of *Laphangium luteoalbum* individuals in the recorded populations and the area covered were not indicated. Habitat data for this species are also scarce. It was usually found growing on eroded riverbanks and wet sand (Lazdauskaitė, 1980; Rašomavičius, 2007).

A new *Laphangium luteoalbum* locality in Lithuania was discovered in August 2020 in Neringa (Western Lithuania, Curonian Spit National Park, the Grobštas Nature Reserve; Fig. 1). The plants occupied ca. 9 m wide and 35 m long strip of wet sand in the transition zone between wet dune slack and grey dune habitats. The population covered an area of ca. 310 m$^2$, although the apparent total area of suitable habitat was ca. 1400 m$^2$. The density of plants varied

considerably throughout the area. The highest densities were found in the wet sand at the edge of the dune slack (Fig. 2), while further away, in the drier sand, only scattered solitary individuals occurred. A count of plants that had reached generative maturity indicated that the population in 2020 consisted of at least 500 individuals. At the time of the survey, *Laphangium luteoalbum* was in the mass flowering phase, but individual capitula of some plants were already shedding mature seeds.

In the plant community where *Laphangium luteoalbum* is located, the predominant species were *Agrostis capillaris* L., *Agrostis stolonifera* L., *Carex nigra* (L.) Reichard, *Rumex acetosella* L., *Salix repens* subsp. *rosmarinifolia* (L.) Andersson and *Scorzoneroides autumnalis* (L.) Moench. *Centaurium erythraea* Rafn, *Festuca ovina* L., *Gypsophila muralis* L., *Herniaria glabra* L., *Lysimachia vulgaris* L., *Mentha arvensis* L. and *Potentilla argentea* L. were also recorded in the community. The total plant coverage was about 60%. The remaining surface was sand covered with a thin layer of plant debris. Completely bare sand accounted for ca. 10% of the surface area. No bryophytes were found in the community.

Although *Laphangium luteoalbum* has been found in Lithuania at various times along the banks of the River Nemunas and in the western part of the country, it cannot be strictly assumed that the newly discovered locality is represented by plants descending from historical populations. Data on the viability of *Laphangium luteoalbum* seeds in soil were not available. Still, it has been suggested that seeds of *Gnaphalium uliginosum* with a similar ecology can remain viable in the soil for up to 100 years (Poschlod & Rosbakh, 2018). If *Laphangium luteoalbum* seeds have the same longevity, populations can be expected to re-establish in some areas on the banks of the River Nemunas if conditions are favourable. However, we assume that *Laphangium luteoalbum* seeds may have been transported to Lithuania by the wind from other parts of Europe. Relatively little is known about long-distance seed transfers. Still, the importance of this phenomenon, especially under climate change, maybe much more significant for the wind-dispersed plants than generally supposed (Heydel et al., 2014). For example, an isolated population of this species has been found in the UK and is thought to be of anthropogenic origin (Gurney, 2004), but, likely, wind transport of seeds from the continent across the English Channel has been responsible.

An assessment of the historical and current distribution of *Laphangium luteoalbum* shows that the occupancy and species' area of occurrence have decreased significantly in Lithuania over the last 100 years. If we include populations recorded in the 19th century in the assessment, the decline would be even more significant (Fig. 1). Regardless of which data we look at, the area of occurrence of the species has decreased by more than 90%. The number of individuals in the only known population of the species is now estimated at around 500. Still, the number of individuals may fluctuate considerably depending on the species' biological characteristics (González-Pérez et al., 2008). The transience of habitats of the

Fig. 2. Flowering *Laphangium luteoalbum* in the Grobštus Nature Reserve, Neringa, August 2020 (photo by Z. Gudžinskas)

species may cause the fluctuation and decline of the population. Periodically eroded, moderately moist or wet sandy soils are rare and highly vulnerable habitats (Valentina et al., 2013; Gudžinskas & Taura, 2021; Kącki et al., 2021; Taura et al., 2022). Wet sand habitats along rivers and lakes are particularly affected by the eutrophication of water bodies, which results in the growth of tall and nitrophilous plants, completely altering the habitat conditions (Galloway et al., 2004; Hrčka, 2005; Brauns et al., 2011).

Although the species had relatively recently been assessed as Data Deficient (DD) due to a lack of information (Rašomavičius, 2021), a reassessment according to the IUCN (2012) criteria led us to conclude that the species should be considered Critically Endangered [CR A1a,c; B2a,b(ii,iii), c(iv); C2a(ii)] in Lithuania. Therefore, the population status of *Laphangium luteoalbum* should be continuously monitored and assessed, new populations in potential habitats should be searched for, and, if necessary, habitat management measures implemented. However, the conservation of annual or short-lived threatened plant species is challenging, and there are very few examples of good practice (Holl & Hayes, 2006).

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