

Short communication

# First record of *Prangos trifida* (Apiaceae) in Croatia

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**Abstract** – Three individuals of *Prangos trifida* (Mill.) Herrnst. & Heyn (Apiaceae) were found in Croatia for the first time in 2013. The population has increased in the last ten years and in 2023, 30 individuals were found. *Prangos trifida* grows on the small islet of Zmorašnji Opuh (Puh) in the Kornati National Park (Dalmatia) within the vegetation of salt-sprayed rocky cliffs. The taxonomic status, ecology and origin of the species are briefly discussed.

**Keywords:** eastern Adriatic, ecology, islets, NE Mediterranean, *Prangos*

## Introduction

The genus *Prangos* Lindl. (Apiaceae, Apioideae) comprises 50 accepted species, distributed from Europe to Mongolia and the western Himalayas (POWO 2023). Most species occur in Asia, and the centre of diversity of the genus is the Iranian-Turanian region (Pimenov and Leonov 1993). *Prangos* is polymorphic and varies considerably in habit and flower and fruit morphology, making it difficult to determine the genus boundaries (Lyskov et al. 2017a). A monographic treatment of *Prangos* was published by Herrnstadt and Heyn (1977), while subsequent taxonomic revisions have involved significant changes in the system of the genus and related genera (for details see Pimenov and Tikhomirov 1983, Lyskov et al. 2017 a,b, and references therein).

In Europe, *Prangos* species occur from Portugal to South European Russia (POWO 2023). For the Euro-Mediterranean region, 23 *Prangos* species and four subspecies have been listed (Euro+Med 2006-2023).

Of the *Prangos* species in Croatia, only *P. ferulacea* (L.) Lindl. has been reported from the southern part of the country (Visiani 1852). Lovrić (1995) also reported the association “*Opopanaci-Prangetum ferulacei* (Adamović 1911) Lovrić 1987” from the Dubrovnik region. However, the presence of *P. ferulacea* has never been confirmed in the field.

Here we report the first record of *Prangos trifida* (Mill.) Herrnst. & Heyn found in Croatia during fieldwork on the islands of the Middle Adriatic (Dalmatia).

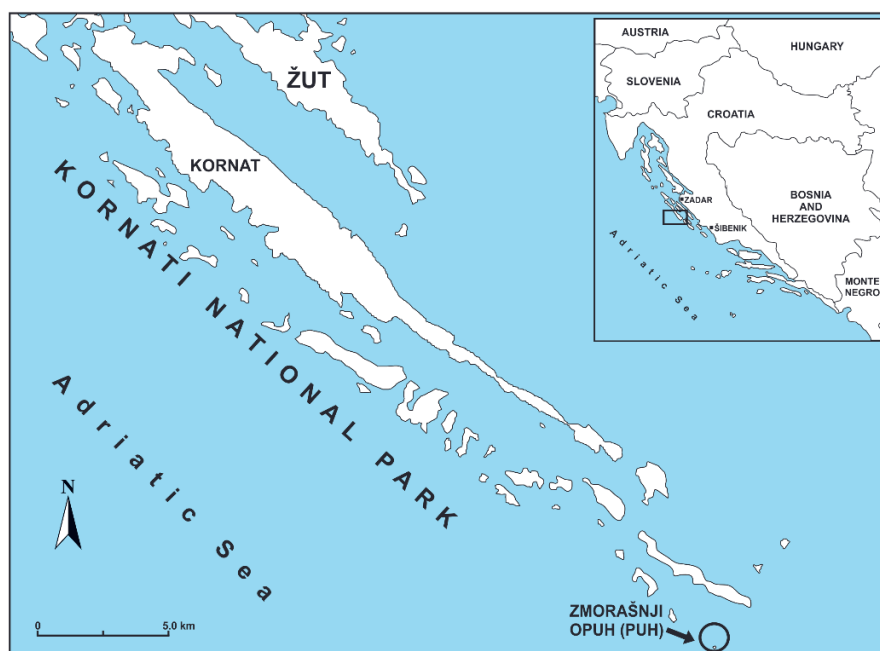
The taxonomic status of *P. trifida* and of the closely related species *Cachrys alpina* M.Bieb. must be briefly highlighted. Tutin et al. (1981) recognised these species as separate taxa with different geographical ranges – *C. trifida* (later replaced to *Prangos*) is the western Mediterranean plant found in Albania, France, Italy, Portugal, Spain, “Yugoslavia”, while *C. alpina* occurs in SE Europe, from North Macedonia to SE Russia. This taxonomic concept is widely accepted in different sources (WCVP 2020, WFO 2023, POWO 2023, Musolino et al. 2023). In these databases, “Yugoslavia” is given as the range for both species. This is still confusing and does not help to clarify the boundaries of the species. Indeed, an improvement of these databases, after more than 30 years of the collapse of the former state, might be obligatory.

In this report we followed the concept that *P. trifida* and *C. alpina* are two species, according to the descriptions in keys and books (Tutin et al. 1981, Josifović 1973, etc.). Anyway, taxonomic inconsistencies appear both in the literature (e.g. Duran et al. 2005, Teofilovski 2015, Barina et al. 2015, etc.) and in databases (GBIF Secretariat 2022, Euro+Med 2006-2023).

## Material and methods

The study is based on field research in the Kornati National Park (KNP) in 2013 and 2023. The KNP (223.75 km<sup>2</sup>) is an area of 91 islands, cliffs and sea reefs in the eastern part

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**Fig. 1.** Map of the study area with location (circled) of the islet of Zmorašnji Opuh (Puh) in the southeastern part of the Kornati National Park. The square on the map in the upper right corner shows the study area in the SE European context.

of the Middle Adriatic (Fig. 1). The bedrock consists of carbonate rocks, mainly Cretaceous limestones and dolomites (Pandža 2010). Brown soil (calcareous cambisol) of shallow to medium depth is the most widespread type. The climate is Mediterranean, with an average annual air temperature of 16.3 °C and an average annual precipitation of 571.8 mm. North winds prevail. The KNP is classified among Croatia's Important Plant Areas (IPAs) and is part of the Natura 2000 ecological network (Official Gazette 2019). Halophilic and halotolerant vegetation overlap largely due to the constant influence of the sea (waves, salt spray and strong winds) over a small altitudinal gradient on most of the islets. The increase in tourism, the abandonment of traditional agriculture, physical changes in ecosystems, the invasion of exotic species and global climate change are the factors that contribute most to environmental risks (Pandža 2010).

A phytosociological relevé was collected using the Braun-Blanquet approach (Braun-Blanquet 1964, Westhoff and van der Maarel 1980). The nomenclature of the taxa follows the International Plant Names Index (IPNI 2023). The collected plant was deposited in the herbarium CNHM (Thiers 2023).

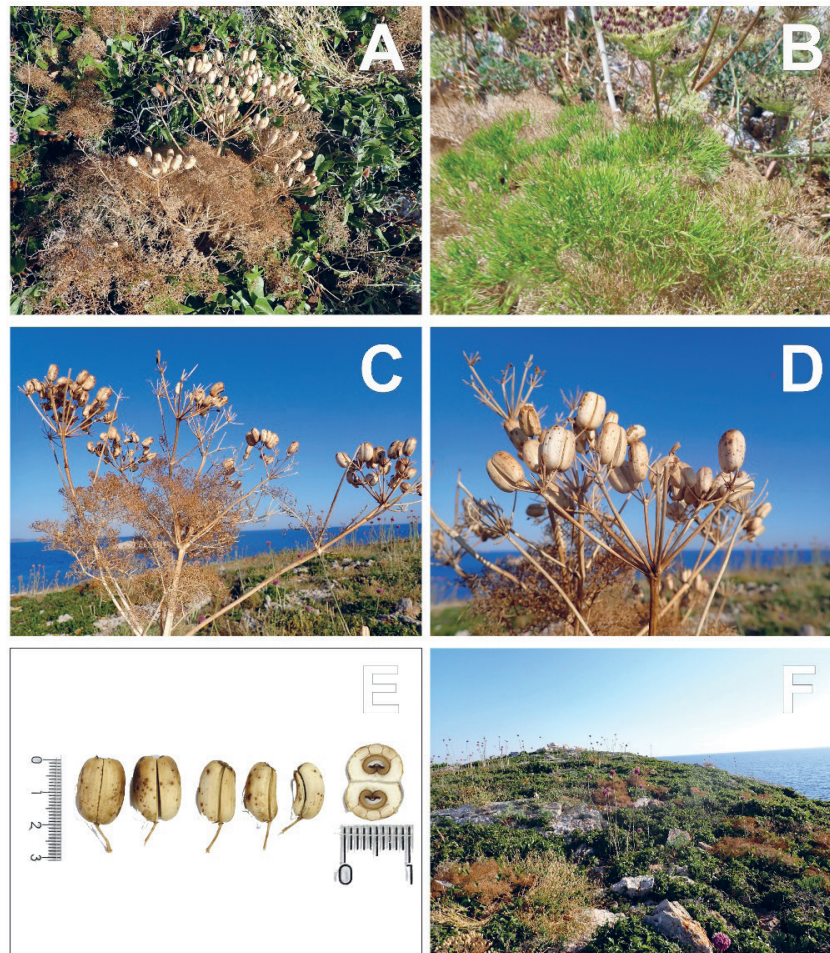
## Results and discussion

On 2 July 2013, *P. trifida* was recorded for the first time in this country. It was found as follows: Croatia, North Dalmatia, Šibenik-Knin County, Murter-Kornati Municipality, Kornati National Park, Donji Kornati, islet of Zmorašnji Opuh (Puh; an area of 0.014 km<sup>2</sup>), altitude 10 m a.s.l., geographical coordinates 43.676164 N, 15.495563 E, date 10 July 2023, leg. M. Pandža, det. N. Jasprica and M. Pandža, herbarium code: CNHM, 600:ZAG; 9206:BOB.

*Prangos trifida* was found within the rupicolous herb-rich vegetation of salt-sprayed rocky cliffs of the alliance *Limonion anfracti-cancellati* (Horvatić 1934) Mucina in Mucina et al. 2016 (Fig. 2). The phytosociological relevé [plot size: 50 m<sup>2</sup>; coordinates (WGS84): latitude 43°40'34.2", longitude 15°29'44.0"; altitude 10 m a.s.l.; aspect: -; stoniness 10%; rockiness 20%; vegetation cover 70%; vegetation height 1 m; date: 10 July 2023] includes list of taxa as follows: *Smilax aspera*, 3; *Prangos trifida*, 2; *Prasium majus*, 2; *Allium commutatum*, 2; *Daucus carota* subsp. *hispanicus*, 1; *Crithmum maritimum*, 1; *Asparagus acutifolius*, 1; *Silene vulgaris*, 1; *Limonium cancellatum*, +; *Lotus cytisoides*, +; *Reichardia picroides*, +; *Elymus athericus*, +; *Mercurialis annua*, +.

On the first visit to the islet, three individuals were found. A decade later (10 July 2023), 30 individuals were counted on the islet. The species was not found during an exploration of the surrounding islets of the archipelago. It is unclear whether this population is native or introduced. The population of *P. trifida* found in this study is located between those reported from the province of Liguria (NE Italy) in the north and Montenegro (GBIF Secretariat 2022) and Albania (Barina et al. 2015) in the south. Interestingly, Conti et al. (2005) described the Italian population as "no longer recorded".

Although some recent studies (e.g., Wojewódzka et al. 2019) reject, at least partly, any role for anemochory in the dispersal of Apioideae fruits, we think that both zoochorous dispersal modes (endozoochory, epizoochory) are eligible because (i) the islet is a nesting site for gulls, (ii) the area is on one of the major migration routes in the region and includes habitats important for the conservation of migratory bird species (Kralj et al. 2013, Purger 2015). Furthermore, the influence of the environment (habitat, wind frequency, etc.) on the survival of the plants cannot be ignored (Wen et al. 2020).



**Fig. 2.** *Prangos trifida* (Mill.) Herrnst. & Heyn in Croatia, Middle Adriatic, Kornati National Park, islet of Zmorašnji Opuh (Puh). A – habit, B – lower leaves, C – upper leaves with fruits, D – fruits, E – fruits (left) and cross sections through fruit (right), scale: cm, F – habitat (photo: M. Pandža, N. Jasprica).

In the present case, *P. trifida* occurs within the low rocky coastal vegetation belt. In contrast, Pignatti et al. (2017-2019) reported an altitudinal range of the Ligurian population from 800 to 1600 m a.s.l. In Albania, it was found on limestone within the *Buxus sempervirens* L. dominated community at 981 m a.s.l. (Barina et al. 2015). According to Jury (2003), *P. trifida* occurs in the Iberian Peninsula on uncultivated places in the altitudinal range 0-1700 m.a.s.l. In France, it occupies garrigues and rocks (MNHN, OFB (2003-2023). Although the GBIF network contains a large data set on the distribution of *P. trifida*, especially from the southern coast of Portugal (Faro area, Algarve) and the Mediterranean coasts of Spain and France, the data are based on the field observations which do not provide details on the type of the communities or habitats (GBIF Secretariat 2022).

In our opinion, further field surveys are essential to determine the actual distribution and ecology of *P. trifida* in Croatia. Furthermore, it would be desirable to monitor the species in order to assess the conservation status of the population described here. Last but not least, the biological potential of some substances and the phytochemical content of the essential oil isolated from *P. trifida* are of importance (Abad et al. 2001, Palá-Paúl et al. 2004).

## Acknowledgments

The authors would like to thank colleagues Zoltán Barina, Naim Berisha and Aco Teofilovski for providing information on the distribution of *P. trifida* and *C. alpina* in Albania, Kosovo and North Macedonia, respectively. We thank Steve Latham (UK) for improving the language. Two anonymous reviewers are also thanked for their helpful suggestions.

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