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Datura innoxia Mill. (Solanaceae), a new alien species in the flora of Bosnia and Herzegovina

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Abstract: Downy thorn-apple *Datura innoxia* Mill is native in southwest U.S.A. and Mexico. It has been recorded as a new alien species to the vascular flora of Bosnia and Herzegovina. In Bosnia and Herzegovina, *D. innoxia* is reported from two localities in the city of Mostar where the species has escaped cultivation and established small populations in surrounding ruderal habitats including waste land. The species is toxic to animals and humans. The paper presents a short morphological characteristic and photographs as well as the distribution of the species in the Bosnia and Herzegovina.

Keywords: alien plants, Bosnia and Herzegovina, *Datura*, distribution, garden escape, morphology.

Introduction

The genus *Datura* L. belongs to the tribe *Datureae* G. Don, of *Solanaceae*. There are about 10 species which occur naturally in south-western USA and Mexico, and parts of Central America (Dupin & Smith 2018). Within the genus *Datura*, only six species have been recorded as escapees in Europe of which four have been reported in the Balkans: *Datura ferox* L., *Datura innoxia* Mill., *Datura metel* L. and *Datura stramonium* L. (Valdés 2012).

To identify this new alien species, we present an adjusted key to the species of *Datura* in Balkans, based on Haegi (1976), Child & Shaw (1999) and Shaw (2000).

1 Capsule deflexed, breaking irregularly when ripe; leaves entire, repand, sinuate or singly lobed; seeds brown or yellowish 2
1 Capsule erect, breaking regularly into 4 entire valves when ripe; leaves doubly lobed; seeds black 3
2 Capsule with numerous short blunt tubercles; corolla white, purple or yellow, normally 5-lobed; plants hairless or sparsely hairy with simple hairs only .....*D. metel*
2 Capsule with numerous slender sharp spines; corolla white, normally 10-lobed; plants densely velvety hairy with glandular hairs .....*D. innoxia*
3 Capsule with more than 100 spines of similar length .....*D. stramonium*
3 Capsule with fewer than 60 spines of unequal length .....*D. ferox*

Datura innoxia Mill. (syn. *Datura meteloides* Dunal), also known as Downy thorn-apple and its native range is from south-western USA and Mexico, through Central America to northern and western South America (CABI 2018). Occasionally grown as an ornamental plant in gardens, this species now has a wide distribution in the warmer parts of both hemispheres. The species is a rare garden escapee, occasionally naturalised on dumps or as a remnant of cultivation in some parts of the European continent (CABI 2018). The aim of the article is to report the first record of the species in the flora of Bosnia and Herzegovina.

Material and methods

The field study was conducted in the summer of 2018 and 2019. Digital photographs and GPS coordinates were taken in the field. The identification of the specimens was done according to Haegi (1976), Hammer et al. (1983), Child & Shaw (1999) and Shaw (2000). The nomenclature follows Valdés (2012). The voucher specimen is deposited in the Herbarium of the National Museum of Bosnia and Herzegovina (SARA, 51983).

Results and discussion

Datura innoxia is a stout, annual to perennial herb to up to 2 m high, with swollen taproot, and a spreading crown up to 2 m in diameter. Stems with dense, spreading glandular hairs. Mature leaves broadly ovate, the lamina up to 20 cm long, almost entire, slightly sinuate, or irregularly lobed towards the base. Inflorescence of solitary, bisexual flowers in the bifurcations of the branches; peduncles about 10 mm, stout. Calyx 5-10 cm long, narrowly cylindrical, 3-6-lobed; lobes 13-20 mm long, sometimes incompletely separated. Corolla white with green veins, infundibuliform, with a tube 15-16 cm long, spreading gradually towards the apex and terminating in 10 small, subulate lobes. Stamens not exerted; anthers 8-10 mm long. Style 10-14 cm long; stigma well below anthers. The fruit is a globose or ovoid spiny capsule with numerous slender spines, about 3-5 cm in diameter, deflexed, spiny; spines numerous, slender, sharp, all about equal in length, to 10 mm long; persistent base of calyx to 20 mm long, very prominent. Capsule breaking irregularly when ripe, releasing brown seeds. Seeds D-shaped, compressed, 4-5 mm long (Fig. 1), (adapted from Haegi 1976 and Sell & Murrell 2009).

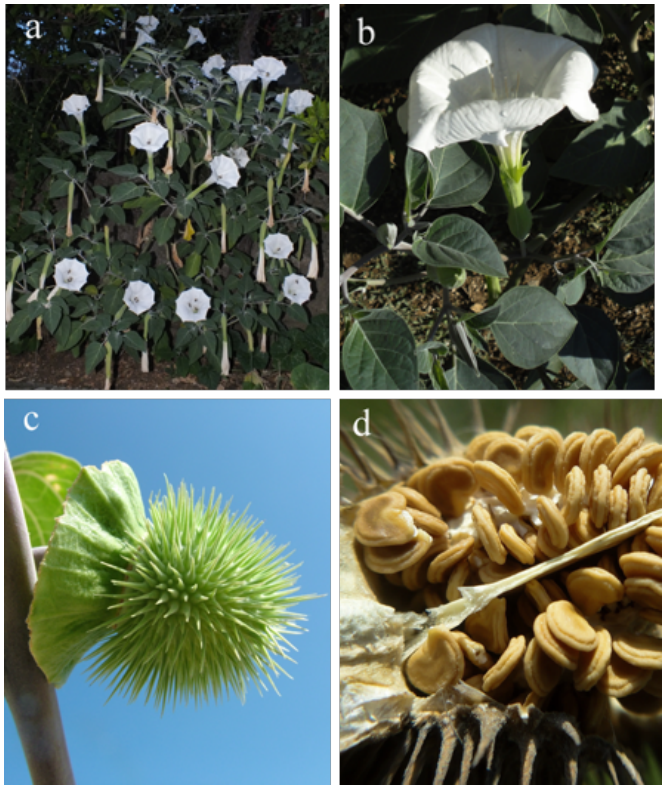

Fig. 1. ***Datura innoxia*** **Mill. in the Bosnia and Herzegovina: a – habitat b – flower c – capsule d – seeds (Photos a, c by S. Maslo; b, d by Š. Šarić)**

Fig. 2.The distribution of ***Datura innoxia*** **Mill. in the Bosnia and Herzegovina. Cultivated plants (black dots) and plants escaped from cultivation (red dot).**

Based on our field studies, we have found that D. *innoxia* is also present in Bosnia and Herzegovina, both as cultivated ornamental plant, but as well as an escape. We have registered this species in eight localities in Central Bosnia and Southern Herzegovina of which two relate to plants that have escaped from cultivation (Fig. 2). In Bosnia and Herzegovina, this species as escaped from cultivation was first registered in 2018. Two individuals of *D. innoxia* were found in the city of Mostar, in the area of Sjeverni logor, on slopes of waste and soil piles near the newly built bridge over the Neretva River. Another record of *D. innoxia* was made on the rubbish tips in the Mostar`s quarter Pasjak in 2019. Three individuals were recorded and two of these were large, well-developed individuals with ripening fruits.

Recent chorological data on cultivation and garden escaping

Central Bosnia:

1 Banovići, 44°24'27" N, 18°31'45" E, 334 m, cultivated (Šarić, Š. field obs., 08.2018)
2 Maglaj, cemetery, 44°32'32" N, 18°06'02" E, 191 m, cultivated (Šarić, Š. field obs., 08.2018)
3 Zavidovići – Ribnica, 44°20'43" N, 18°23'35" E, 297 m, cultivated (Šarić, Š. field obs., 08.2018)
4 Zenica – Vranduk, 44°16'55" N, 17°54'45" E, 293 m, cultivated (Šarić, Š. field obs., 08.2018)
5 Zenica – Topčić polje, 44°21'23" N, 17°56'15" E, 278 m, cultivated (Šarić, Š. field obs., 08.2018)
6 Žepče, 44°25'24" N, 18°02'27" E, 226 m, cultivated (Šarić, Š. field obs., 08.2018)

South Herzegovina:

7 Mostar – on the rubbish tips in the Mostar`s quarter Pasjak, 43°21'00" N, 17°48'50" E, 76 m, escaped from cultivation (Maslo, S. field obs., 07.2019)
8 Mostar – Sjeverni logor, on slopes of waste and soil piles near the newly built bridge over the Neretva River, 43°21'28" N, 17°48'32" E, 62 m, escaped from cultivation (Maslo, S. field obs., 07.2018)

Datura species are thought to spread solely by seed which it produces in large number. The seeds are distributed by ants and some species of birds that are resistant to the chemicals they contain. The way of introduction is unknown, probably from seeds, which got to dumps and disturbed areas with garden waste. In Bosnia and Herzegovina, this species currently is casual species and its establishment is highly possible. The potential invasive behavior of the species should be monitored in the following years.

In Europe, escaped populations of *D. innoxia* have mostly been found at roadsides and different types of ruderal habitats. It has been recorded in most countries of Southern and Central Europe as well as in some countries of Northern Europe: Austria (Essl & Rabitsch 2002), Belgium (Verloove 2006), Bulgaria (Greuter & Raus 2005), Croatia (Franjić 1993; Pandža & Stančić 1999; Pandža et al. 2001), Czech Republic (Danihelka et al. 2012), European Turkey (Vladimirov et al. 2013), France (Kerguélen 1999), Great Britain (Sell & Murrell 2009), Greece (Arianoutsou et al. 2010), Italy (Pignatti 1982), Lithuania (Gudžinskas 2017),

Montenegro (Caković et al. 2014), Norway (Gederaas et al. 2012), Portugal (Almeida & Freitas 2001), Romania (Anastasiu et al. 2011), Russia (Seregin 2014), Spain (Castroviejo et al. 2012), Serbia (Lakušić et al. 2017), Slovakia (Medvecká et al. 2012), Slovenia (Martinčič et al. 1999), Sweden (Karlsson 1997) and Ukraine (Mosyakin & Fedoronchuk 1999). In the Mediterranean region *D. innoxia* has established, whereas in other regions it is ascribed to the group of casual species. According to Sanz et al. (2004) the species is referred to as invasive in France, Italy, Portugal and Spain as well as in Croatia (Boršić et al. 2008; Nikolić et al. 2009).

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