

***Salvia hispanica* L. (Lamiaceae), a new alien species in the flora of Bosnia and Herzegovina and the Balkans**

Semir Maslo¹ & Šemso Šarić²

¹ Primary School, Lundåkerskolan, Gislaved, Sweden; semmas@edu.gislaved.se

² Jelaške, Olovo, Bosnia and Herzegovina; semsosumar@gmail.com

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Abstract: *Salvia hispanica* L. native in S Mexico to Ecuador is now widely grown for its edible seeds ('chia'). It has been recorded as a new alien species to the vascular flora of Bosnia and Herzegovina and the Balkans. In Bosnia and Herzegovina, *S. hispanica* is reported from two localities near the town of Žepče in Central Bosnia in November 2019. The specimens were growing along the banks of the Bosna River in the vicinity of the village Begov Han. Brief information on the species distribution in Bosnia and Herzegovina and a short morphological description is given.

Keywords: casual alien, chia, distribution, morphology, new record.

Introduction

The genus *Salvia* L. (Mentheae, Lamiaceae) is a genus of approximately 900 species with a worldwide distribution with main centres of diversity in SW Asia and Central and South America (Harley 2004). *S. hispanica* belongs to the neotropical subgenus *Calosphace*, section *Potiles* Epling (Wood & Harley 1989).

Salvia hispanica L. (syn. *Salvia chia* Colla) is native to Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico and Nicaragua (Govaerts 2003), however is currently cultivated in Australia, Bolivia, Colombia, Guatemala, Mexico, Peru and

Argentina (Busilacchi et al., 2013). The expansion of chia is limited because it is a photoperiod sensitive plant and it is intolerant to frost in all development stages. As a short-day plant (12 - 13 hours), its period of flowering depends on the latitude of its location. In the Northern Hemisphere chia begins to flower in October (Baginsky et al. 2017). The aim of the article is to report the first record of the species in the flora of the Balkans, especially in Bosnia and Herzegovina.

Material and Methods

The field study was conducted at the end of November 2019. Digital photographs and GPS coordinates were taken in the field by an iPhone GPS app. The identification of the specimens was done according to Standley & Williams (1973) and Ramírez-Zea et al. (2016). The nomenclature follows The Plant List (2013). The voucher specimen from the locality near the Pepelarska Rijeka is deposited in the Herbarium of the National Museum of Bosnia and Herzegovina (SARA, 51997).

Results and discussion

Salvia hispanica is rather stout, strict, erect annual, 20–100 cm high. Stems are simple or sparsely branched, densely grayish- tomentulose or puberulent. Mature leaves are ovate to lanceolate, the lamina 5–8 cm long, acuminate, cuneate at the base, distinctly serrate, densely pubescent on both surfaces, somewhat paler beneath. Inflorescence of terminal racemes 5–17 cm long, rather dense, only the lowest verticillasters not confluent. Verticillasters with 6 to 20 flowers. The flowers very numerous, almost sessile; bract ovate-acuminate, persistent; calyx in flower 7–8 mm long, densely whitish-hirsute, elongating to 11 mm in fruit, rather bulbous at the base, the upper lip 5-veined. Corolla sky-blue, the tube cylindrical, 4.5–5.5 mm long, the upper lip 3 mm long, the lower 3.5–5 mm long; style densely glandular at the base. Nutlets oval, lustrous, 1.8 mm long, smooth, mottled with black and gray (mainly adapted from Standley & Williams 1973 and Wood & Harley 1989). Chromosome counts are $2n = 12$ (Haque & Ghoshal 1980).

In the end of November 2019, four *Salvia hispanica* plants (Fig. 1) were found in two close localities around the town of Žepče (Central Bosnia) (Fig. 2). All plants were well-developed specimens about 100 cm in height, two of which were in flower.

Chorological data

1. Žepče, Begov Han, 44°20'58"N, 17°59'24"E, elevation 253 m, two flowering plants were recorded on 24th November 2019, on riverine gravel terraces along the right bank of the Bosna River near the mouth of the Pepelarska Rijeka. In this locality, *S. hispanica* was accompanied by *Amaranthus hybridus* L., *Amaranthus retroflexus* L., *Panicum capillare* L., *Setaria pumila* (Poir.) Roem. & Schult., *Sonchus asper* (L.) Hill. and *Solanum decipiens* Opiz.

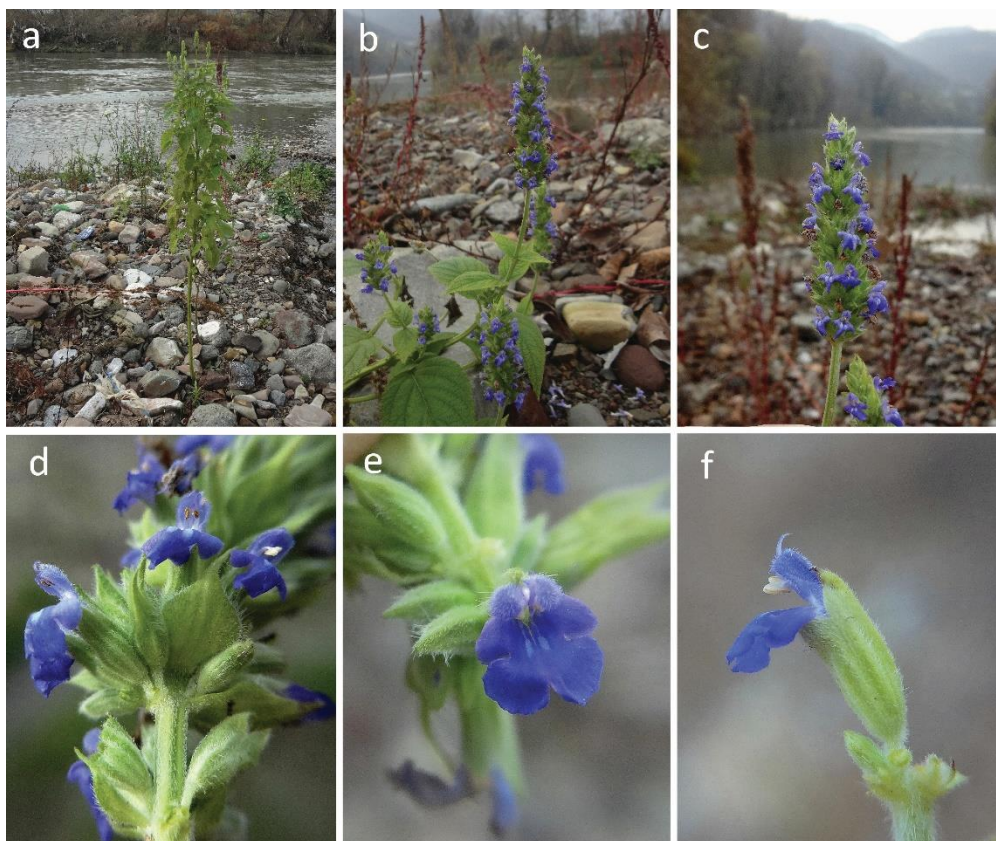


Fig. 1 *Salvia hispanica* L. on gravel bars along the banks of the Bosna River: a – habitat b – whole plant c – inflorescence d – bract e – flower f – flower, side view (Photo Š. Šarić).

2. Žepče, Begov Han, 44°21'27"N, 17°59'54"E, elevation 251 m, two vegetative plants were recorded on 24th November 2019 in semi-natural fringe vegetation on the right bank of the Bosna River, about 1,5 km downstream from the mouth of the Pepelarska Rijeka In this locality *S. hispanica* was accompanied by *Amaranthus caudatus* L., *Amaranthus hybridus* L., *Amaranthus retroflexus* L., *Ambrosia artemisiifolia* L., *Bidens frondosa* L., *Cucurbita pepo* L., *Erigeron canadensis* L., *Setaria pumila* (Poir.) Roem. & Schult., *Sonchus asper* (L.) Hill., *Solanum decipiens* Opiz., *Stellaria aquatica* (L.) Scop., *Urtica dioica* L., *Zea mays* L. and *Xanthium orientale* subsp. *italicum* (Moretti) Greuter.

S. hispanica is increasingly cultivated in Europe for human food. Only recently, since 2012, from certain European countries have been reported its sub spontaneous occurrence, e. g. in Austria (Sauberer & Till 2015), Belgium (Verloove 2015), Czech Republic (Kaplan et al. 2018), Germany (Hohla 2016), Great Britain (Berry 2018), Italy (Ballelli 2015; Buono & Magrini 2018), Spain (Aymerich 2016; Gómez-Bellver et al.

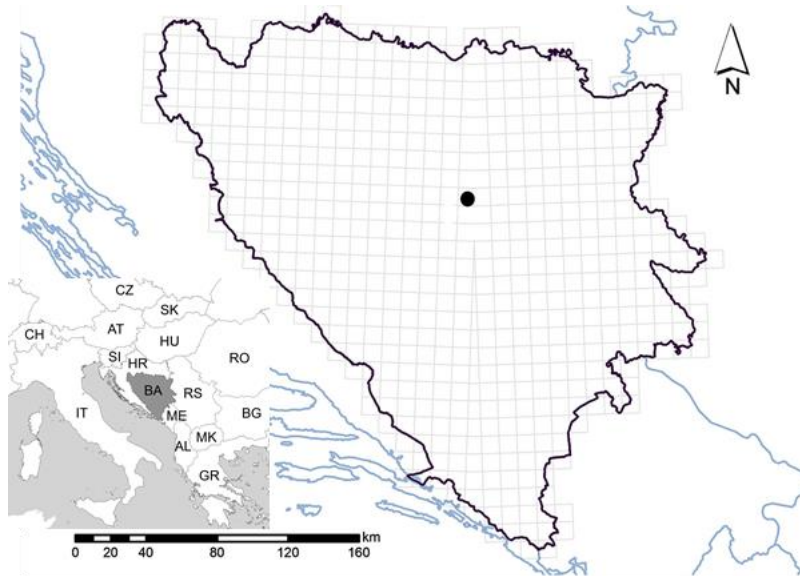


Fig. 2 The recent findings of *Salvia hispanica* L. in Bosnia and Herzegovina.

2016; Verloove et al. 2018), Slovenia (Dakskobler et al. 2019) and Sweden (Shah & Coulson 2019).

S. hispanica is considered as casual alien species in Europe that does not form self-sustaining populations in the natural environment (Dakskobler et al. 2019). In Central and North Europe *S. hispanica* has mostly been found at different types of human-made habitats such as: at the railway tracks, the wastewater treatment plant and landfills and sewage sludge (Berry 2018; Hohla 2016; Shah & Coulson 2019; Verloove 2015). On the other hand, in the Mediterranean region and Czech Republic, this species has been recorded mostly on the rivers banks (Aymerich 2016; Ballelli 2015; Dakskobler et al. 2019; Kaplan et al. 2018). According to Buono & Magrini (2018) the plant regularly develops flowers and fruits in Italy and its establishment in the country is highly possible.

In Bosnia and Herzegovina, this species is currently a casual species, and it is unlikely that it will establish and reproduce the population itself in the next year, due to its extreme frost sensitivity. The potential invasive behaviour of the species should be monitored in the following years.

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