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Note

Salvinia minima (Salviniaceae) a new non-native species for the Iberian Peninsula

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Abstract

Salvinia minima (Salviniaceae) is here reported as a new non-native species to the flora of the Iberian Peninsula. A population was recently found in the Besòs river (Barcelona province) and a sample collected in 1999 at the Ebro Delta (Tarragona province) would also be referable to this species.

Key words: Non-native plants, ferns, Mediterranean Region, chorology.

Resumen

Salvinia minima *(Salviniaceae) nueva especie alóctona para la península Ibérica*

Salvinia minima (Salviniaceae) se cita como una nueva especie alóctona para la flora de la península Ibérica. Recientemente se ha encontrado una población en el río Besòs (provincia de Barcelona) y una muestra recogida en 1999 en el Delta del Ebro (provincia de Tarragona) también sería atribuible a esta especie.

Palabras clave: Plantas alóctonas, helechos, Región Mediterránea, corología.

Salvinia minima Baker in J. Bot. 24: 98 (1886)

SPAIN. Barcelona: Santa Coloma de Gramenet, Besòs river, 31TDF3388, 13 m, 15 November 2024, *S. Garcia*, det. *L. Sáez* (BC997643).

The genus *Salvinia* Ség. (Salviniaceae) comprises approximately 12 species, mostly of tropical distribution (America, Eurasia and Africa, including Madagascar). *Salvinia minima* Baker (Salviniaceae),

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is a floating aquatic fern native to South and Central America; it was introduced in the southern United States in the late 1920s (Jacono *et al*., 2001). The species is cultivated as an ornamental plant in aquaria, backyard ponds and pools (see Philip *et al*., 2012; Rowe *et al*., 2018); it is currently considered an invasive species (Global Invasive Species Database, 2024).

Salvinia minima was sometimes confused with the species of the *S. auriculata* group, mainly *S. adnata* Desv. (= *S. molesta* D.S. Mitch.). However, *S. minima* differs from the species of the *S. auriculata* group in the arrangement of the hairs over the papillae on the upper leaf surface. Those in *S. minima* are free, while those of *S. auriculata* group are joined at their tips (Machado *et al*., 2016; Rosati *et al*., 2020; Global Invasive Species Database, 2024).

Salvinia minima has relatively small floating blades, usually 5-10(15) mm long, rounded, the papillae on upper face are relatively long, c. 1 mm long (in our samples we have measured up to 1.2 mm long) with usually four hairs over the papillae, not joined at their tips (Figure 1). The most similar species is *S. adnata*, with floating blades usually 15–25 mm, rounded, the papillae on upper face are relatively long (c. 1 mm long) with hairs over the papillae joined at tips. *Salvinia natans* (L.) All., a species native to Europe, Asia and northern Africa, has blades of floating leaves clearly longer than broad, 15 x 10 mm, the papillae on upper face are relatively short (0.2-0.8 mm long) with hairs over the papillae not joined at tips.

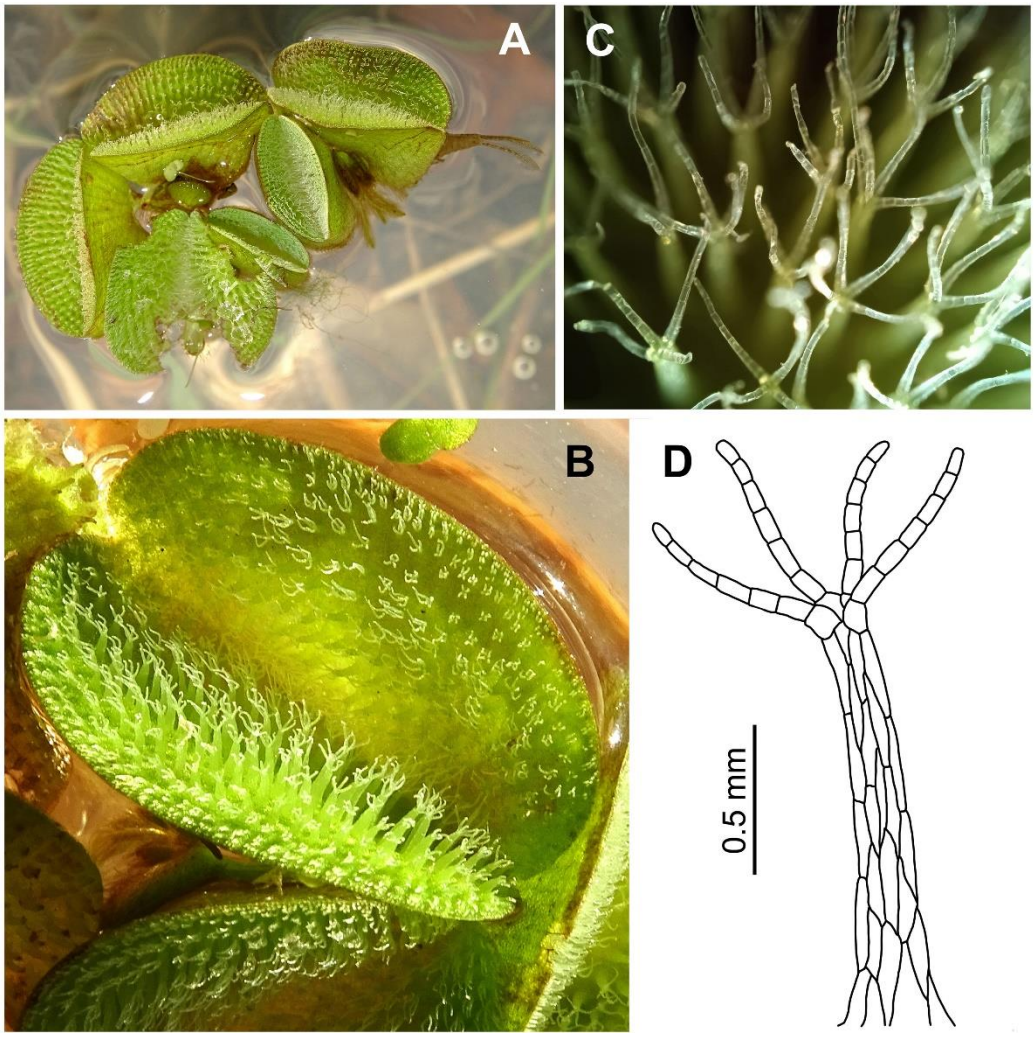

Figure 1. *Salvinia minima* from Santa Coloma de Gramenet, Barcelona. A) Plant. B) upper floating leaf. C) Hairs of the upper floating leaves not joined at their tips. D) Papillae of the upper floating leaves with hairs not joined at their tips. Photos and drawing: Llorenç Sáez.
Figura 1. Salvinia minima *procedente de Santa Coloma de Gramenet, Barcelona. A) Planta. B) Haz de una hoja flotante. C) Haz de una hoja flotante con los pelos no unidos en sus extremos. D) Papila del haz de una hoja flotante con los pelos no unidos en sus extremos. Fotos y dibujo: Llorenç Sáez.*

Among the species introduced in North America with hairs on papillae with free tips is *Salvinia oblongifolia* Mart., native to Brazil. This species has floating leaves 25-45 mm, oblong, with short papillae (up to 0.1 mm long) on upper face (Jepson Flora Project, 2019).

The first confirmed record of *S. minima* for Europe was provided by Rosati *et al*. (2020) from southern Italy, Calabria, where it is considered as casual. The Global Biodiversity Information Facility (queried with the R package 'rgbif'; Chamberlain *et al*., 2025) records the species in the Netherlands, Germany and Denmark (mostly from citizen science platforms), from 2018-2024 (GBIF, 2024). The iNaturalist platform holds additional European observations (from 2021-2023), including one from Southern Spain that lacks sufficient detail for a confident identification (iNaturalist, 2025). While some global databases indicate *S. minima* in Spain (Global Invasive Species Database, 2024; Mikulyuk & Nault, 2008), this is in all probability a mistake due to works that cite "Flora Europaea" (Madeira *et al*., 2003), which does not consider *S. minima* (Lawalrée, 1964; Rosati *et al*., 2020). The genus *Salvinia* is included in the Spanish Catalogue of Invasive (Boletín Oficial del Estado, 2013), at a time in which *S. minima* had not yet been recognized in Spain (Ministerio para la transición ecológica y el reto demográfico, 2013).

Figure 2. *Salvinia minima* in Santa Coloma de Gramenet, Barcelona. A) Habitat. B) Dense population of *Lemna minor* and *Salvinia minima*. Photos: Sergi Garcia.
Figura 2. Salvinia minima *en Santa Coloma de Gramenet, Barcelona. A) Hábitat. B) Población densa de* Lemna minor *y* Salvinia minima*. Fotos: Sergi Garcia.*

The presence of the species in Santa Coloma de Gramenet is most likely due to a naturalization project of the Besòs river carried out by the Metropolitan Area of Barcelona. Three ponds were created that are fed by effluents from the Montcada i Reixac treatment plant. Hydrophytes (*Potamogeton* spp.) and helophytes (*Sparganium erectum* L.*, Iris pseudacorus* L.*, Eleocharis palustris* (L.) Roem. & Schult.*, Alisma lanceolatum* With.*, Helosciadium nodiflorum* (L.) W.D.J. Koch, *Typha latifolia* L. and *Scirpus holoschoenus* (Rich.) Herter) were planted in the ponds. Due to the eutrophic nature of the ponds, there has been a significant colonization of duckweed (*Lemna minor* L.) in one of the ponds, where *Ludwigia peploides* (Kunth) P.H. Raven, a dangerous invasive species also present in other parts of the river, is proliferating. Three channels were also created that flow into the river and are also fed by water from the treatment plant. *Salvinia minima* was found in a flooded depression of about 30 x 7 m in surface and 30 cm in depth (Figure 2), located below the old bridge of Santa Coloma de Gramanet.

The introduction of *Salvinia minima* in the Iberian Peninsula must date back at least to the end of the last century, since a sample (identified as *S. natans*) collected by R. Balada in 18 September 1999 at the Ebro River Delta (Tarragona province) corresponds to *S. minima*. This sample (scarce and pressed) was assimilated to *S. molesta* by Sáez & Aymerich (2021) (L. Sáez herb. pers.-BCB), since it had hairs apparently joined at the tips on the papillae. However, this wrong interpretation was due to the fact that the sample had no intact hairs, which are necessary for positive identification. A more detailed observation of the sample allows us to observe that the trichomes, mainly those located towards the midvein of the leaves, are not joined at the tips.

With this report of *S. minima*, three species of the genus are known in the Iberian Peninsula. *Salvinia natans*, a species whose native status in our area is uncertain, has been reported from the north of the province of Gerona (Bolòs & Vigo, 1984; Paiva, 1986). Recent field work carried out in the areas where it has been cited in Catalonia has not allowed the species to be relocated. *Salvinia adnata* which has been reported (as *S. molesta*) from Portugal, where it is considered naturalized since 2010 (Almeida & Freitas, 2012). Regarding the degree of establishment of *S. minima*, in the Besòs River it cannot be considered naturalized, but at the moment we do not have data on the situation of the population in the Ebro Delta.

Conflict of interest

The authors declare that they have no conflicts of interest relevant to the content of this manuscript.

CRediT authorship contribution statement

Conceptualization: LS, SG, EF, MR, SM. Investigation: LS, SG, EF, MR, SM. Visualization: LS, SG. Writing - Original Draf Preparation: LS. Writing - Review & Editing: LS, SG, EF, MR, SM.

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