

# First report of the invasive aquatic plant *Elodea nuttallii* (Hydrocharitaceae) in the Iberian Peninsula

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## Abstract

*Elodea nuttallii* is reported for the first time in the Iberian Peninsula. A naturalized and well established population has been discovered in the upper river Ter, Catalonia.

**Key words:** Alien flora, invasive species, aquatic plants, Spain, Catalonia, Pyrenees.

## Resumen

Primera cita de la planta acuática invasora *Elodea nuttallii* en la la Península Ibérica

Se cita por primera vez *Elodea nuttallii* en la Península Ibérica. Una población naturalizada y consolidada ha sido descubierta en el curso alto del río Ter, Cataluña.

**Palabras clave:** Flora alóctona, especies invasoras, plantas acuáticas, España, Cataluña, Pirineos.

*Elodea nuttallii* (Planch.) H. St John, Rhodora 22:29. 1920.

**ESPAÑA, Girona.** Sant Joan de les Abadesses, Ter river between Cal Gat and Ribamala, UTM 30TDG3674-3774, 715-730 m a.s.l., 1-X-2021, P. Aymerich (BCB - P. Aymerich 2021-001) (Figura 1).

*Elodea nuttallii* is an aquatic plant included in the List of Invasive Alien Species of European Union concern (EU Regulation N° 1143/2014). In Spain it was included in the Spanish Catalog of Invasive Species (Real Decreto 613/2013) a few years ago although it had not been observed in this territory yet. In this note we provide the first record of *E. nuttallii* for Spain and the whole of the Iberian Peninsula.



Figure 1. *Elodea nuttallii*: stem and leaves.

Figura 1. *Elodea nuttallii*: tallo y hojas.

This species is native to North America (Haynes, 2000), but it is currently present as an alien in much of Europe and also in China and Japan (EPPO, 2021). The first European observations date from 1914 in Britain. Between 1940 and 1950 it was established in western continental Europe, from the Netherlands to north-eastern France and Germany (Josefsson, 2011). In the following decades its expansion continued, first through western, central and northern Europe, and from the 1990s to the east and south-east, reaching Ukraine, Romania and Bulgaria (Georgiev *et al.*, 2019). Heading south, it was established in northern Italy in the 1990s (Banfi & Galasso, 2010) and from 2000 onwards it gradually expanded to central and southern France (Tison & Foucault, 2014; Tison *et al.*, 2014). In some areas, the expansion of *E. nuttallii* has caused a displacement of *Elodea canadensis* Michx., another invasive American species introduced in the 19th century (Simpson, 1990; Josefsson, 2011). Several works (Thiebaut, 2005; Greulich & Trémolières, 2006; Prokopuk & Zub, 2019) show that *E. nuttallii* has a wider ecological valence than *E. canadensis* and particularly it is more tolerant to water eutrophication.

The first population of *E. nuttallii* detected in the Iberian Peninsula is located in a 1200 m stretch of the river Ter in the Eastern Pyrenees. It is concentrated in two sections with stagnant water and silty bottoms created by two small dams, but it is nearly absent in a short intermediate section with faster water flow and pebble bottom. *E. nuttallii* is locally abundant and forms dense masses (Figure 2) that together occupy

a few hundred m<sup>2</sup>, especially in the upper section of stagnant water, where it covers almost 50% of the surface. The characteristics of this population suggest that it was established a few years ago, in the 2010s. In relation to this first Iberian location of the species, it is interesting to note that the Eastern Pyrenees appear as the only southern European “alert area” (areas with a high probability of invasion despite being more than 100 km from known locations) in the modelling of the invasive capacity of *E. nuttallii* by Steen *et al.* (2019). A future expansion into the river Ter is foreseeable, due to the transport of plant fragments downstream by the river flow and the establishment of new local populations in stretches of stagnant water.



**Figure 2.** A dense monospecific population in a small reservoir of the river Ter.

**Figura 2.** Una población monoespecífica densa en un pequeño embalse del río Ter.

The origin of this population is unknown, which could be the result of both a local introduction (dumping of plants used in aquariums) and a long-distance colonization related to transport by waterfowl or by anglers. The nearest documented localities are located about 200 km in Languedoc (Camargue and southern margin of the French Massif Central) according to the most up-to-date distribution map in France (MNHN. 2021). In France *E. nuttallii* has not yet been recorded close to the Eastern Pyrenees, but some populations are recorded in the foothills of Western Pyrenees, from where it seems likely a next expansion to the Iberian Peninsula from the Basque Country.

The general appearance of *Elodea nuttallii* is similar to that of *E. canadensis*, a species already known in the Iberian Peninsula as allochthonous, although it is rare (Talavera & Gallego, 2010). Floral characters are of little utility in identifying the two species in Europe, because they only bloom exceptionally, so foliar characters must be used. *E. nuttallii* typically have narrower and more elongated leaves, linear or linear-lanceolate, while those of *E. canadensis* are linear-oblong to ovate, but both species show some variability (Simpson, 1988; Thiebaut & di Nino, 2009, Prokopuk & Zub, 2019). It is also common for *E. nuttallii* to have the leaf lamina twisted and at least some of them to be strongly recurved, but this is not always the case and, for example, Ter plants do not have recurved leaves and

are only slightly twisted. Characters that are useful for identification of these two species, that are commonly used in Europe (Simpson, 1986; Stace, 2010) and that have been observed in the Ter population, are the shape of the leaf apices (clearly acute or acuminate in *E. nuttallii*, obtuse or subacute in *E. canadensis*) and the width of the leaves 0.5 mm below the apex (maximum 0.8 mm in *E. nuttallii*, more than 0.8 mm and up to 2.3 mm in *E. canadensis*). The usual leaf width is also a good character, less than 1.7 mm in *E. nuttallii* and more in *E. canadensis* (Haynes, 2000), but the extremes of variability of the two species can overlap.

Another *Elodea* species is naturalized in Europe, but it is much rarer and is only known from Britain and some locations of Central Europe (Josefsson, 2011). It is *E. callitrichoides* (Rich.) Casp., native to temperate zones of South America. It is very similar to the *E. nuttallii* forms with slightly twisted and not recurved leaves, and both of them have been confused in some areas (Vandenporten *et al.*, 2000). The distinction by vegetative characters is very difficult and must be based mainly on the length of the marginal teeth of the leaves and the colour of the tips of the adventitious roots, usually reddish in *E. callitrichoides* and white or gray-green in *E. nuttallii* (Simpson, 1986). This last character has been analyzed in the population of the river Ter and all the roots tips are white or greenish, as in *E. nuttallii*.

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