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Potamogeton schweinfurthii in the Iberian Peninsula

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Abstract

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We provide the first records for the Iberian Peninsula of *Potamogeton schweinfurthii* A. Benn., a species distributed mainly in Africa that was not discovered in Europe until 2005, where it is assumed to be indigenous but it has generally been confused with *P. lucens*. The Iberian specimens, which for the most part are from recent collections, have been identified based on morphological characteristics and molecular studies. We have detected 8 localities, 4 in the northeastern area of the Peninsula (Catalonia and Navarra) and 4 from the West (south and north of Portugal and western Andalusia). Our studies show that it is a very rare species on a regional level. Although it is a mainly tropical and subtropical species, we have found that *P. schweinfurthii* (both natural populations and those cultivated) has a high tolerance to climates with severe winters and frequent frosts. The large proportion of populations found in anthropogenic habitats, and the fact that most European records are from the past half-century, suggest that *P. schweinfurthii* may have experienced a recent expansion favoured by the construction of large number of artificial water bodies in the Mediterranean region. This raises the possibility that *P. schweinfurthii* in Europe is a species that forms temporary populations and has a naturally unstable area.

Keywords: *Potamogeton*, aquatic plants, habitat, distribution, *Flora iberica*, Europe.

Resumen

Aymerich, P., Kaplan, Z., Guardiola, M., Petit, A. & Schwarzer, U. 2012. *Potamogeton schweinfurthii* en la Península Ibérica. *Anales Jard. Bot. Madrid* 69(2): 187-192 (en inglés).

Se aportan las primeras citas de *Potamogeton schweinfurthii* A. Benn. en la Península Ibérica, una especie de área básicamente africana que no fue descubierta en Europa hasta 2005, donde se supone que es autóctona y en general había sido confundida con *P. lucens*. Los ejemplares ibéricos han sido identificados por sus caracteres morfológicos y por estudios moleculares y, en su mayor parte, proceden de recolecciones recientes. Se ha detectado en 8 localidades, 4 del noreste peninsular (Cataluña y Navarra) y 4 del oeste (sur y norte de Portugal y Andalucía occidental). Según la información actualmente disponible, se trataría de una especie muy rara a escala regional. Aunque se trata de una especie en general tropical y subtropical, se ha constatado la gran tolerancia de *P. schweinfurthii* a climas de inviernos rigurosos, con heladas muy frecuentes, tanto en poblaciones espontáneas como en plantas cultivadas. La alta proporción de poblaciones halladas en hábitats antrópicos y la concentración de las citas europeas en el último medio siglo sugieren que puede haber experimentado una expansión reciente favorecida por la construcción en la región mediterránea de gran cantidad de masas de agua artificiales. Se apunta la posibilidad de que *P. schweinfurthii* sea en Europa una especie que tiende a formar poblaciones temporales y tenga un área naturalmente inestable.

Palabras clave: *Potamogeton*, plantas acuáticas, hábitat, área de distribución, *Flora iberica*, Europa.

INTRODUCTION

In the last decade, a number of different studies have appeared which have led to a broader knowledge of the taxa of the *Potamogeton lucens* group (*sensu* Wiegleb, 1988), both in terms of the number of recognized species and their distribution (Wiegleb, 1995; Wiegleb & Kaplan, 1998; Kaplan & Symoens, 2005; Kaplan, 2005; Lastrucci & al., 2010). One of the most notable outcomes of these studies was the discovery of *P. schweinfurthii* A. Benn. in Europe (Kaplan, 2005). This taxon has a mainly African distribution, and in many characters it resembles the closely related *P. lucens* L. and *P. illinoensis* Morong, which have Eurasian and American distributions, respectively (Wiegleb & Kaplan, 1998).

Potamogeton schweinfurthii is characterized by an unbranched or sparingly branched stem, sessile to shortly petiolate submerged leaves that have a narrowly lanceolate to narrowly elliptical lamina with mostly 7 longitudinal veins, and an acute to mucronate apex, and the rare occurrence of floating leaves (Kaplan, 2005). In Europe, it is most likely to be confused with *P. lucens* (Kaplan, 2005), from which it can be separated by a series of characters (Table 1). It can also be confused with other *Potamogeton* taxa such as *P. alpinus* Balb., *P. coloratus* Hornem, *P. gramineus* L., *P. nodosus* Poir. and *P.* × *salicifolius* Wolfg. (Kaplan, 2005; Lastrucci & al., 2010).

Until a decade ago, the known area of *P. schweinfurthii* was limited to the African continent, Madagascar, and nearby islands, and the odd locality of the Azores in the Atlantic Ocean. The latter populations were originally described as *P. lucens* var. *azoricus* by Bennett (1904), but this taxon became synonymous with *P. schweinfurthii* (Wiegleb, 1995). The species has been recorded widely in Africa, although most citations are in eastern and southern areas, with a more dispersed presence in the rest of Sub-Saharan Africa, and only a few localities in the north of the continent (Kaplan & Symoens, 2005).

The existence of *P. schweinfurthii* in the Mediterranean Basin has been documented in Egypt since the end of the 19th century, and there are herbarium specimens that were collected in Tunisia in 1908, although these were only correctly identified recently (Kaplan & Symoens, 2005), and it has also been recorded in all North African countries with the exception of Morocco. In general, these latter records correspond with areas that have more of a Saharan than Mediterranean influence and, in Algeria, it is only found in the Saharan mas-

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Table 1. Diagnostic characters of *Potamogeton schweinfurthii* and of the most similar Iberian *Potamogeton* taxa, based on Kaplan (2005), García-Murillo (2010) and own observations.

	P. schweinfurthii	***P. lucens***	***P. gramineus***	***P. alpinus***	***P. coloratus***	***P. nodosus***	***P. × salicifolius***
Branching pattern	unbranched or sparingly branched	sparingly to richly branched	sometimes sparingly but mostly richly branched	always unbranched but occasionally with horizontal leafless stolons	mostly unbranched	mostly unbranched	sparingly to richly branched
Presence of floating leaves on adult fertile plants	generally absent	always absent	mostly present	mostly present	sometimes present	almost always present	always absent
Shape of lamina of submerged leaves	narrowly lanceolate to narrowly elliptical	oblong to broadly elliptical,sometimes additionally also with a few narrowly lanceolate leaves	narrowly oblong to oblong-lanceolate	narrowly lanceolate to oblong	oblong to elliptical	narrowly oblong to oblanceolate-oblong	narrowly lanceolate to elliptical
Length:width ratio of lamina of upper submerged leaves	4-17(21)	2-6, seldom up to 10 in some leaves in addition to broader leaves	5-21	4-11	3-8	5-11(15)	3-10
Length of lamina of submerged leaves (mm)	65-170(250)	(30)70-180(240)	(15)40-90(135)	(20)60-110(150)	(27)70-150	(50)80-180(225)	60-120(200)
Width of lamina of submerged leaves (mm)	7-24(28)	(11)25-65	(2)4-8(17)	(5)10-25	8-45(65)	(10)14-38	14-40
Number of longitudinal veins in lamina of upper submerged leaves	(5)7(11)	9-11	5-7(9)	9-17	9-17	11-17(21)	(9)11-17
Shape of apex of submerged leaves	acute to mucronate	acute to rounded and mucronate	acute to mucronate	broadly obtuse or tapering to a narrow but obtuse tip	narrowly obtuse to subacute	narrowly obtuse to subacute, never mucronate	acute to rounded and indistinctly apiculate
Length of petiole of submerged leaves (mm)	0-5(15)	2-7(18), usually of relatively constant length along the stem	0	0	3-65	(13)30-110 (225)	0(1)
Occurrence of phyllodial leaves	often present near the base of the stem	always present near the base of the stem, sometimes also in the upper parts in addition to laminar leaves	always present near the base of the stem	absent	absent	absent	rarely present and only partially reduced
Fruit length (with rare extremes in brackets)	2.9-3.9(4.1)	3.3-4.7(5.1)	2.4-3.1(3.6)	2.7-3.3	1.3-1.9	2.9-4.3	absent (sterile plants)
Colour of dry ripe fruit	greyish green to yellowish green	greyish green to yellowish green	mid green to dark green	ochre brown to light reddish brown	dark green	reddish brown	absent (sterile plants)
Shape of thickening in the endodermal cells in stem	U-type	U-type	U-type	O-type	O-type	O-type	O-U-type
Presence of interlacunar bundles in the cortex of stem	present, usually in one circle,rarely in two of which one is incomplete	present, in 1-3 circles	present, in one outer circle	absent	absent	absent, rarely a few present	present, in 1-2 incomplete circles

sif of Tassili. Due to its regional rarity, the IUCN (García & al., 2010) has recently designated this species as Near Threatened (NT) status in North Africa.

Although Wiegleb & Kaplan (1998) had speculated on the possible presence of *P. schweinfurthii* on some Mediterranean islands, it was not until 2005 that its presence in Europe was confirmed by Kaplan (2005), who documented the species for the islands of Corsica, Sardinia, Malta, Crete and the Ionian island of Cephalonia. All the records were based on herbarium material – the oldest from 1958 – most of which had been previously attributed to *P. lucens*, or in one case (Malta) to *P. alpinus*, or were undetermined. All localities were in lowland areas (0-80 m) with thermo-Mediterranean environments, a so with a distribution that seemed quite co-

herent with the requirements of a plant that mainly inhabits Sub-Saharan Africa.

Lastrucci & al. (2010) widened the known area of *P. schweinfurthii* to the European mainland with the discovery of current and recent populations of the species in Central and Southern Italy, in the regions of Tuscany, Le Marche and Apulia. Some of these plants had also previously been mistaken for *P. lucens*. Furthermore, these localities broadened the ecological spectrum of the species in the Mediterranean basin, given that some of those in Tuscany are inland, in relatively upland areas (up to 330 m) where winter frosts are not uncommon.

This paper presents the first records of *P. schweinfurthii* in the Iberian Peninsula. Additionally, we consider aspects of the ecology and dynamics of this species in Europe.

MATERIAL AND METHODS

Our study is based mainly on recently (2007-2011) discovered populations of *P. schweinfurthii*, and on specimens encountered in various herbaria whilst preparing a monograph of the Potamogetonaceae within the framework of the Species Plantarum Project – Flora of the World (for the complete list of studied herbaria see Kaplan 2008, 2010a, 2010b). A complementary revision was also carried out of accessible herbarium material previously attributed to *P. lucens*, as this is the species with which *P. schweinfurthii* has most often been confused. An exhaustive revision of the BC, BCN and JACA herbaria provided an overview of the distribution of both of these taxa in the northeastern Iberian Peninsula (Catalonia and the river Ebro Basin), and likewise a revision of SEV material provided data for other localities in the Iberian Peninsula.

Identifications of *P. schweinfurthii* and other broad-leaved potamogetons occurring in this region were made according to morphological characters and diagnoses given by Kaplan (2005) and Lastrucci & al. (2010).

In parallel studies, material from three recent localities (two from Catalonia and one from Portugal, see below for details) was analysed using molecular techniques. The ITS region of nuclear ribosomal DNA was sequenced and the sequences compared to that of *P. schweinfurthii* from geographically distant localities within the known distribution range of the species: Kenya, Azores and Italy (Kaplan & Fehrer, 2011).

RESULTS

The herbarium and field investigations confirmed the presence of *P. schweinfurthii* as a new species for the Iberian Peninsula. Eight localities were identified in the northeast and west of the Iberian Peninsula (Fig. 1). Three of these were from Catalonia (recent field data) (Fig. 2), one from Navarra (voucher), two from western Andalusia (vouchers), one from southern Portugal (recent field data), and one from northern Portugal (ancient voucher). All herbarium specimens of *P. schweinfurthii* had been initially identified as *P. lucens.* In addition, there are several probable localities in SW Portugal, but these have not been yet sampled. The details of the field study areas and localities of herbarium vouchers are given in Appendix 1.

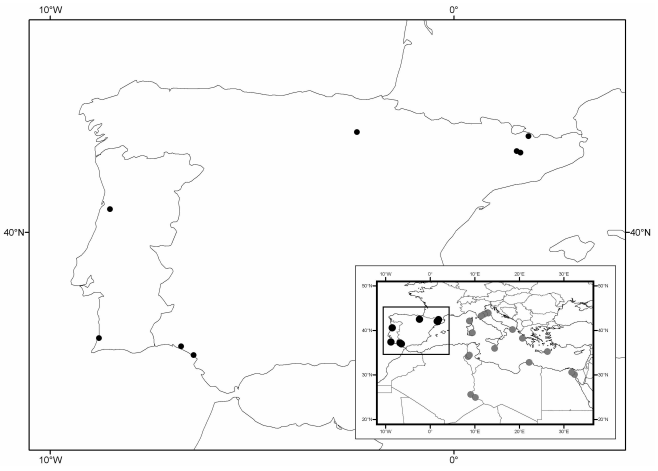

Fig. 1. Distribution of *Potamogeton schweinfurthii* in the Mediterranean region based on Kaplan (2005) and Lastrucci & al. (2010) (grey circles) and our new records (black circles).

The morphological identification of *P. schweinfurthii* from the Iberian Peninsula was confirmed in parallel molecular studies (Kaplan & Fehrer, 2011; Kaplan & Fehrer, unpublished). ITS sequences of samples from southern Portugal and northern Spain were compared with those from Kenya, Azores and Italy and they were found to be identical and different from the sequences of all other broad-leaved *Potamogeton* species.

With regard to phenology, the three populations observed in Catalonia behaved as perennials: many leaves died in winter, but some remained green, and we observed a rapid growth of new leaves and stems in April-May. Flowering occurs between May and October, and the presence of fruits in the spike (in different stages of maturation) occurs from late June until December.

DISCUSSION

Our study extends to the Iberian Peninsula (Spain and Portugal) the distributional area of *P. schweinfurthii*, a taxon that was not included in the recent revision of the genus for the *Flora iberica* (García-Murillo, 2010). The presence of this species in the Peninsula is not surprising, but was perhaps to be expected after its recent discovery on the islands of Corsica and Sardinia and mainland Italy (Kaplan, 2005; Lastrucci & al., 2010). Moreover, taking into account the distances between the recently identified Iberian localities and their environmental heterogeneity, we believe that *P. schweinfurthii* may well be present in other areas. Since *P. lucens* has been widely cited for other Iberian localities (García-Murillo, 1990), and this species has often been confused with *P. schweinfurthii*, a detailed revision of herbarium material and some intensive fieldwork could well result in new localities. It is remarkable that in the reservoir of "las Cañas" (Navarra) both *P. lucens* and *P. schweinfurthii* have been recorded within a period of 19 years. As far as we are aware, this is the first time that the two species have been collected in the same locality.

Even though we expect that this species will be found in new Iberian locations, the information that has been gathered

Fig. 2. *Potamogeton schweinfurthii.* Two specimens recently collected in NE Spain (BCN 80550, BCN 80551. See Table 1).

to date indicates that *P. schweinfurthii* is very rare in the Peninsula. The absence of *P. schweinfurthii* in the revised vouchers from the NE Iberian Peninsula support this view, as does the fact that in a recent survey of 262 water bodies in Central Catalonia, *P. schweinfurthii* was located in solely two, that is only in 0.76% of the localities surveyed (Aymerich, unpublished data). This frequency is almost identical to the proportion (0.77%) of specimens of *P. schweinfurthii* recognized by Kaplan (2005) after reviewing 1,300 vouchers of *Potamogeton* from the Mediterranean Europe.

One question that immediately arises when new aquatic plant species are discovered for a local flora is their possible allochthonous nature, especially since in the last century there were numerous cases of hydrophytes being introduced voluntarily or involuntarily, and which in many cases subsequently behaved as invasive plants. This does not seem to be the case with *P. schweinfurthii*, as there have been known collections from North Africa for more than a century (Kaplan & Symoens, 2005). The most probable explanation is that this species remained undetected until recent times due to its marked rarity and the confusion with other species (Kaplan, 2005), but can not be excluded that that this species is naturally expanding its area to northern regions. On the other hand, it is somewhat surprising that all the European specimens now recognized as *P. schweinfurthii* were collected after the middle of the 20th century, with the oldest known specimens dating from 1956 (Portugal: this article) and 1958 (Sardinia: Kaplan, 2005; Lastrucci & al., 2010). Kaplan (2005) attributed this fact to an increase in botanical surveys in the Mediterranean region in the last few decades. However, this argument does not explain the absence of previous collections in Catalonia, where, until 1930, there was a notable amount of botanical research activity that also included aquatic plants, and where there are more specimens of *P. lucens* from the first half of the century than from the second half. Indeed, the areas in which this species has now been discovered were visited by botanists at the beginning of the 20th century, and Cadevall's *Flora de Catalunya* (1933) cites all of the *Potamogeton* currently known – even the rarest and most localised – with the exception of *P. schweinfurthii*. Although it is possible that this species remained undiscovered in this area due to its rarity, we think it is more likely that the species occurs in temporary populations, linked to the random introduction of propagules to certain waterbodies followed by suc-

cessful colonization. This hypothesis is supported by the fact that two of the three Catalan populations were found in artificial ponds created less than 25 years ago, so that the plants there must be recently established. In this case, its dynamic in the region could be considered naturally unstable, as such populations may die off when the conditions cease to be favourable for the species, either due to changes in environmental conditions, or in the bodies of water, or as a result of competition from other hydrophytes.

In SW Portugal, *P. schweinfurthii* is widely distributed in an artificial irrigation channel system near Rogil (Faro District) that was built in 1940. However, the species was also observed (but not yet sampled) in natural streams in various localities in S Portugal (e.g. Ribeira da Asseca, Tavira, District of Faro or Rio Mira east of Odemira, District of Beja). Neither in the artificial habitat nor at the natural sites did it present any characteristics of an aggressive invasive species.

We do not know if the above interpretation can be generalized to include all of the Mediterranean populations, but given the high percentage (around 50%) of populations that occupy artificial habitats we cannot exclude this possibility. If it is indeed the case that most of the Mediterranean populations of *P. schweinfurthii* are ephemeral or temporary, the construction in recent decades of many artificial bodies of still water (for irrigation or urban consumption) may have facilitated this situation. And such recent expansion offers an alternative explanation to the possibility that most European specimens were collected after 1950 due to enhanced botanical research. Another possible interpretation that cannot be excluded is that of global warming, although it seems quite improbable, given the tolerance of this species to low temperatures as discussed below.

As well as widening the European distribution area of *P. schweinfurthii* to include the Iberian Peninsula, some of the localities included in the present study show that this species can successfully establish itself in much colder areas than previously thought. In the Mediterranean region, all the localities known until now were situated in areas of low altitude (maximum 330 m) with mild winters, which is coherent with a mainly African species. The Portuguese and Andalusian populations fit this pattern (www.meteo.pt; www.aemet.es), but not those from the north-east, which are in relatively high areas (380-1050 m), with no marine influence, and relatively cold winters. In the latter locations, the bodies of water inhabited by *P. schweinfurthii* regularly freeze in winter, as is also likely for the localities found in Tuscany (Lastrucci & al., 2010). What is striking, however, is the discovery of this plant in an area with a winter climate as harsh as that at Das (Girona, Catalonia) (Fig. 3). Reliable meteorological data for this site is available thanks to the presence of an automatic meteorological station (www.meteo.cat) situated at 1.5 km E-NE and at an altitude of only 30 m higher. According to records of this station, in the 2007-2009 period, the annual average number of days with frost in Das was 164 (45%), and the months between November and March always had more than 23 days per month with temperatures below zero (28 to 31 in January); in the same period, average temperatures in December were 0.36 °C and 0.96 °C in January, with absolute minimum temperature that exceeded –10 °C every year and reached

Fig. 3. *Potamogeton schweinfurthii*. Sanavastre pond, Das, Girona, Catalonia, September 2011.

–16 °C. Moreover, plants of *P. schweinfurthii* from Kenya, Italy and Portugal have been grown for several years in outdoor cultivation tanks in the experimental garden at the Institute of Botany, Průhonice, Czech Republic. They have experienced an even colder climate there. The average temperatures recorded for this region, Central Bohemia, were –4.7 °C in January 2010 and –4.7 °C in December 2010 (http://portal.chmi.cz), with minimum temperatures occasionally reaching as low as about –25 °C. All plants of *P. schweinfurthii*, regardless of its origin, successfully survived all winters under an ice cover. Even though hydrophytes are known to tolerate a wide range of temperatures thanks to the insulating effect of water, it is still surprising that a species that has been considered tropical or subtropical has adapted to an area where there is frost for a significant part of the year. Bearing in mind this tolerance to frost, and its probable dissemination by birds, we consider it is likely that populations of *P. schweinfurthii* will be detected in non-Mediterranean European areas.

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APPENDIX 1

Localities and specimens examined

Potamogeton schweinfurthii A. Benn.
(*): samples confirmed with molecular techniques

PORTUGAL. **Aveiro:** Águeda, Pateira de Fermentélos, 29TNE4091, c. 10 m, 24-VIII-1956, *B. Rainha* no. 3248, as *P. lucens* (S). **Faro:** *Aljezur, local irrigation channel system 2 km SW of Rogil, 29SNB1635, 90 m, 16-I-2007, *U. Schwarzer,* cult. as Z. Kaplan no. 1883, pressed 2007-2009 *Z. Kaplan* (PRA).

SPAIN. **Barcelona:** *Montmajor, Sorba, artificial pond south of Ca l'Agut, 31TCG8848, 525 m, 15-V-2011, *Aymerich* (BCN 86940) & 29-VI-2011, *Aymerich* (BCN 86939). **Girona:** Das, artificial pond 300 m southwest of Sanavastre ("Bassa de Sanavastre"), 31TDG0593, 1050 m, 29-IX-2010, *Aymerich* (BCN 80551) (Fig. 2) & 25-VII-2011, *Aymerich* (BCN 86941). **Huelva**: Moguer, Lagunas de Moguer, 29SPB91, 7-IX-2009, *I. Carmona & V. Girón*, Det.: B. Valdés as *P. lucens* (SEV 259921 & 259922). Almonte, Parque Nacional de Doñana, Laguna del Sopetón, 29SQA29, 22-VI-2004, *I. Carmona, V. Girón & B. Valdés*, Det.: B. Valdés as *P. lucens* (SEV 259924). **Lleida:** *Olius, artificial pond in the Pla de la Barraca area, 31TCG8052, 620 m, 6-X-2010, *Aymerich* (BCN80550) (Fig. 2). **Navarra:** Viana, Embalse de las Cañas, 30TWN2656, 400 m, 31-V-2007, *A. Díez & C. Molina*, as *P. lucens* (SEV 250155).

Potamogeton lucens L.

SPAIN. **Álava:** Lebutiano, Mugarri, 1988, *Urrutia* (BC 801501). Pantano de Ullibarri, 550 m, 16-IX-1983, *G. Morante & J.A. Alejandre 3423.83* (Herbario Alejandre-Flora de Euskadi). Ullibarri-Gamboa, cerros margosos erosionados, 560 m, 16-IX-1983, *G. Morante & J.A. Alejandre* (Herbario Alejandre-Flora de Euskadi 3430.83, 3488.83, 3484.83, 3493.83). **Barcelona:** Balsa del Tordera, 1979, *Margalef-Mir* (BC 674985, 674986 y 674987). Estanyols del Tordera, 1980, *Margalef-Mir* (BC 675134). Tordera. 1980, *Margalef-Mir* (BC 675135, 675136, 675137, 675139, 675142). **Girona:** Lecta in littoralis prope Blanes, 1876, *J. Pujol* (BC 622463). Empalme, 19-V-1909, *Codina* (BC 638745, BCN 3303). Marina de Blanes, 21-29-VI-1876 *J. Pujol* (Vayreda Herbarium in BC s.n.). Jardí Botànic de Lledó, procedeix de Maçanet de la Selva (l'Empalme), *Vayreda* (Vayreda Herbarium in BC s.n.). Empalme (Maçanet de la Selva), VI-1894, *Vayreda* (Vayreda Herbarium in BC s.n.). Empalme, 17-V-1909, *Cadevall* (BC 823483, 823484). Petit Estany immediat a l'Empalme, 17-V-1909, *Cadevall* (BC 823485). **Huesca:** Pantano de Arguís, 500 m, 1977, *P. Montserrat* (BC 641956). Arguís, cieno de *Chara* y limos, junto a la cola del pantano, 970 m, 11-IX-77, *P. Montserrat* (JACA 191977). Castelflorite, balsa cerca del pueblo, 310 m, 16-VII-97, *J.V. Ferrández* (JACA 347597). Alberca de Cortés, 510 m, 29-V-94, *G. Montserrat* (JACA 454794). Alberja de Loreto, 1980, *Margalef-Mir* (BC 674643, 674999). **Lleida:** Estanho d'Escunhau, Vielha e Mijaran, 1995 m, 21-VIII-2009, *M. Guardiola & A. Petit* (herb. pers. in BCN). Estanho d'Escunhau, Vielha e Mijaran, 1995 m, 22-VIII-2010, *M. Guardiola, A. Petit, E. Chappuis & E. Ballesteros* (herb. pers. in BCN). **Navarra:** Viana, laguna de las Cañas, 370 m, 31-VII-88, *P. Urrutia* (JACA 599388). **Sevilla:** Las Cabezas de San Juan, Laguna del Pilón, 1-VII-1980, *J.A. Amat & R.C. Soriguer* (SEV 88448).

Potamogeton × salicifolius Wolfg. (= *P. lucens* × *P. perfoliatus*)

SPAIN. **Girona:** Banyoles, *Vayeda* (BCN 805465), originally determined as *P. lucens*.

Potamogeton coloratus Hornem.

SPAIN. **Barcelona:** Castelldefels, 1935, *no collector* (BCN 63754), originally determined as *P. lucens*.

Potamogeton sp.

SPAIN. **Huesca:** Embalse de Arguís junto a la Hospedería, sumergido cerca de la orilla, 960 m, 22-IX-2004, *J.L. Benito R* (JACA 277652), originally determined as *P. lucens*.

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