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## Further notes on *Cyperaceae* in the Iberian Peninsula: corrections, adjustments and additions\*

### Abstract

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Recent fieldwork and herbarium revisions have considerably improved the taxonomic knowledge of genera *Cyperus* and *Eleocharis* (*Cyperaceae*) in the Iberian Peninsula. In this paper new records are provided for *Cyperus aggregatus* (2nd record in the province of Huelva, Spain) and *C. serotinus* (first report from Andalucía). *Cyperus croceus* and *C. retrorsus* are reported for the first time from the Iberian Peninsula and, apparently, also from Europe. Previous Spanish records of *Cyperus cyperoides* turned out to be in error for *C. retrorsus*. Analogously, the name *Cyperus bellus* given as naturalized at the Laguna Chica in Moral de Calatrava (Spain) has to be changed to a still unidentified species of *Cyperus*. *C. esculentus* var. *macrostachyus* – a distinct American variety – is a naturalized weed of arable land in northeastern Spain. Finally, part of the collections of *Eleocharis flavescens* from the Iberian Peninsula are in fact proved to belong to *E. caduca*, a weed from the Old World tropics. Genuine *Eleocharis flavescens* is here confirmed from Baixo Alentejo (Portugal).

*Key words:* *Cyperus*, *Eleocharis*, Iberian Peninsula.

### Introduction

Several recent studies have considerably improved the knowledge of the *Cyperaceae* family in the Iberian Peninsula. Castroviejo (2005) on six non-native species of the genus *Cyperus* and provided some updates and corrections in relation to *Cyperus* and *Kyllinga* (Castroviejo 2006). Jiménez-Mejías & al. (2007) drew the attention to the spontaneous occurrence of *Schoenoplectus corymbosus* in southern Spain. In Flora Ibérica Luceño & al. (2007) provided an updated overview of the family, while Verloove & Sánchez Gullón (2008) reported the occurrence of *Cyperus prolifer* near Huelva (Spain).

However, several genera of *Cyperaceae* are notoriously difficult taxonomically and indeed not all problems have been resolved yet. In the present paper several additions, corrections and adjustments are made, primarily in relation to the non-native taxa, based on new herbarium revisions and recent fieldwork.

\* The authors would like to dedicate this paper to the late Dr. Santiago Castroviejo who not only was a fine colleague for both of us but recently also considerably improved the knowledge on the *Cyperaceae* in the Iberian Peninsula.

### Taxonomic remarks

***Cyperus aggregatus*** (Willd.) Endlicher, *Cat. Horti Vindo.* 1: 93 (1842)

(syn.: *C. cayennensis* (Lam.) Britton, *C. flavus* (Vahl) Nees, *Kyllinga cayennensis* Lam., *K. squarrosa* Baldwin, *Mariscus aggregatus* Willd., *M. flavus* Vahl, *M. laevis* Kunth)  
Spain, Huelva: Huelva (UTM 29SPB8427), aceras del aparcamiento de Carrefour. 9-VI-2008 y 24-VII-2008, *E. Sánchez Gullón* 127 (priv. herb. ESG, FV, dupl. MGC 69270).

*Cyperus aggregatus* is a native of South and Central America and the southernmost parts of the U.S.A. It has become naturalized in Australia. In Europe Chaffin & Vivant (1996) reported *Cyperus aggregatus* in southwestern France. A collection in the herbarium of the National Botanic Garden of Belgium (BR) confirms the presence of *Cyperus aggregatus* in this area since at least the 1950's, thus long before the discovery by Chaffin & Vivant (1996). In 2004 *Cyperus aggregatus* was recorded for the first time in Spain in a lawn at the Parador Nacional in Mazagón (Castroviejo 2006), erroneously cited as new to Europe. The present record from Huelva confirms the presence of *Cyperus aggregatus* in the southern part of the province of Huelva, a future naturalization is not unlike.

***Cyperus croceus*** Vahl, *Enum. Pl.* 2: 357 (1805)

(syn.: *Cyperus baldwinii* Torrey, *C. cyclostachyus* Grisebach, *C. globulosus* auct. non Aublet)  
Spain, Huelva: Mazagón, Parador Nacional de Turismo (UTM 29SPB9809), IX-2004, *E. Sánchez Gullón* 16 (priv. herb. ESG, priv. herb. FV, dupl. MA 782684); idem, 24-VII-2008, *E. Sánchez Gullón* 128 (priv. herb. ESG, priv. herb. FV, dupl. BR, VSC, priv. herb. E.J. Clement).

*Cyperus croceus* is a native of Central and South America and the southeastern U.S.A. It is a weedy species of sunny, disturbed areas (Tucker & al. 2002). In Mazagón it grows in an irrigated lawn at the Parador Nacional, along with several other non-native *Cyperaceae* (see below).

In Mazagón *Cyperus croceus* grows together with several subtropical non-native turf weeds, including *Axonopus fissifolius*, *Cyperus croceus*, *Cyperus retrorsus* (see below), *Digitaria violascens*, *Kyllinga odorata*, etc. (Castroviejo 2006; Sánchez Gullón & al. 2006; Verloove & Sánchez Gullón 2008), all apparently introduced unintentionally as contaminants in American grass seed. So far, none of them have been able to spread beyond the initial location of introduction.

***Cyperus retrorsus*** Chapman, *Bot. Gaz.* 3: 17 (1878)

(syn.: *Mariscus cylindricus* Elliott)

Spain, Huelva: Mazagón, close to the lighthouse (UTM 29SPB9312), lawn, very abundant, with *Kyllinga odorata*, 10-X-2007, *F. Verloove* 6969 (priv. herb. FV, dupl. BR, MA 782685, MGC 69271).

This *Cyperus*, which grows in irrigated lawns close to the lighthouse (faro) of Mazagón, was ascribed to *Cyperus cyperoides* by Castroviejo (2006), a weed of the Old World tropics. Luceño & al. (2007) indicated that *Cyperus cyperoides* is a very variable species and that the population from Mazagón possibly belongs to subsp. *flavus* Lye. However, further research, especially based on Tucker & al. (2002), now proves that these plants in fact do not belong to the Old World *Cyperus cyperoides* but to *C. retrorsus*. *Cyperus croceus*, *C. cyperoides* and *C. retrorsus* belong to the rather complex subsection

*Longistyli* Kükenthal (Kükenthal 1936) of *Cyperus* sect. *Umbellati* C.B. Clarke. They are all very similar but can be distinguished as follows:

1. Spikes globose to ovoid, less than twice as long as wide. Fertile florets ca. 3-4 per spikelet.....***C. croceus***
1. Spikes oblong to oblong-cylindrical, more than twice as long as wide. Fertile florets 1-2 per spikelet.....**2**
2. Spikes cylindrical, 20-40 mm long. Spikelets linear-lanceolate. Nut ca.  $2 \times 0.5$  mm, surface nearly smooth ..... ***C. cyperoides***
2. Spikes ovate-cylindrical, 8-12 mm long. Spikelets oblong-lanceolate. Nut ca.  $1.5 \times 0.5$  mm, surface distinctly pappulose ..... ***C. retrorsus***

***Cyperus bellus*** Kunth, *Enum. Pl.* 2: 52 (1837)

In 2004 L. Medina discovered a naturalized population of an enigmatic species of *Cyperus* on the borders of the Laguna Chica near Moral de Calatrava (Ciudad Real, Spain). It was initially ascribed to *Cyperus rubicundus* Vahl by K.A. Lye & H. Väre (Castroviejo 2005). Soon afterwards this identification was changed by G. Tucker (U.S.A.) to *Cyperus bellus*, a closely related African species (Castroviejo 2006). Eventually, it was under this binomial that this species was included in Flora Ibérica (Luceño & al. 2007).

Both *Cyperus rubicundus* (as *C. teneriffae* Poir.) and *C. bellus* belong to section *Rupestres* C.B. Clarke (Kükenthal 1936), a taxonomically very complex and poorly understood group that is badly in need of revision. *Cyperus bellus* surely is a better match than *C. rubicundus* although there are some significant differences. According to Clare Archer (in litt. 09.03.2009) glumes are uniformly brown (light, darkening and becoming golden in age) with a much narrower green keel, later becoming straw-coloured. This is in contrast with the distinctly reddish brown glumes with a broad green keel in the Spanish collections. Moreover, glumes tend to be narrower and more or less acuminate in genuine *Cyperus bellus*, achenes are only 1/3 to 1/2 as long as the glume, etc. Kathleen Gordon-Gray (in litt. 09.04.2009) confirms that *Cyperus bellus* (and *C. rubicundus*) are no good matches.

The Spanish populations of “*Cyperus bellus*” are more or less similar to South African specimens of this species but surely not identical. Future research should clarify the taxonomic position of the population from Moral de Calatrava. The possibility of an as yet undescribed species cannot be excluded.

***Cyperus esculentus*** var. ***macrostachyus*** Boeckeler, *Linnaea* 36: 291 (1870)

(syn.: *Cyperus lutescens* Torrey et Hook., *C. ruficomus* Buckley)

Spain, Lérida: Alcarràs (W-Lérida), maize field, 03.10.2003, *J. Recascens* s.n. (HBIL, dupl. priv. herb. FV); Spain, Barcelona: Gavà, Les Marietes, sandy arable land, abundant, 19-IX-2007, *F. Verloove* 7017 (priv. herb. FV).

*Cyperus esculentus* is an exceedingly variable species. According to De Vries (1991) no higher taxonomic rank than “cultivar” can be warranted to the variations. This point of view was followed in the treatment of *Cyperus esculentus* in Flora Ibérica (Luceño & al. 2007). However, Schippers & al. (1995) demonstrated that, based on an experimentally evaluated character set, four infraspecific taxa should be easily distinguished at varietal level, a treatment adopted by Tucker & al. (2002) for the Flora of North America. Var. *esculentus* roughly corresponds with the cultivated plant (chufa) and probably originates in the Old World tropics. The other varieties are natives of the New World and var. *leptostachyus* Boeckeler apparently is the most widespread taxon in most parts of western Europe (and in North America). It is beyond the scope of this paper to revise all Spanish and Portuguese collections of *Cyperus esculentus* but the keys and descriptions provided by Schippers & al. l.c. doubtlessly are useful tools for a better understanding of the variability of this species in the Iberian Peninsula.

Some peculiar plants of *Cyperus* have been recorded as weeds of arable land in north-eastern Spain (surroundings of Barcelona and Lérida, but probably also elsewhere). So far, they remained unidentified although they somehow resemble *Cyperus esculentus*. Following Schippers & al. (1995) these plants could easily be keyed out as *Cyperus esculentus* var. *macrostachyus*, a native of the southern U.S.A., Central and South America. In this variety spikelets are up to 40 mm long and 3 mm wide and floral scales are ca. 2.9-3.4 mm long (much longer and larger in all its parts than in the other varieties). It seems to be a rare introduction in Europe (also known from the Netherlands; see Schippers & al. l.c.).

***Cyperus serotinus*** Rottb., *Descr. Ic. Rar. Pl.*: 31 (1773)

Spain, Sevilla: Guillena, rivera Huelva S of A460, riverbank, locally, 12-X-2007, *F. Verloove* 6960 (MA).

*Cyperus serotinus* is a rather rare native species in the northeastern portion of Spain and along the Atlantic coast in Portugal (Luceño & al. 2007). The present record apparently is the first one for Andalucía. Along rivera Huelva east of Guillena *Cyperus serotinus* is locally abundant, with *Eclipta prostrata*, *Hemarthria altissima* etc. as accompanying species.

***Eleocharis caduca*** (Delile) Schult., *Mant.* 2: 88 (1824)

(syn.: *Eleocharis intricata* Kükenth.; *E. flavescens* auct. iber. p.p. non (Poir.) Urban)

Portugal, Beira Litoral: Ciraia de Mira, prairies près des lacs, 14-VII-1961, *J. Matos* s.n. (BR); Praia de Mira, nas areias a volta da lagoa, 14-VII-1961, *J. Matos* 7930 (COI) (see also: Paiva 1961; sub *E. flavescens*); Fermentelos, Lado Sul da Pateira de Fermentelos, em frente do Carregal, terreno das ilhotas, 17-VIII-1967, *J. Ormonde* 139 (COI, LISI); Praia de Mira, Barrinha, 13-VII-1981 (COD); Portugal, Estremadura: Sesimbra, Apostica, prox. da Lagoa de Albufeira, nos terrenos ocupados anteriormente por arrozal, 28-VIII-1952, *B.V. Rainha* 2408 (COI, LISI) (see also: Rainha 1956; sub *E. flavescens*); Spain, Islas Baleares, Ibiza, San Miguel, Fuentes d’es Tur, im Torrentabschnitt östl. San Miguel, 10-XI-1971, *H. Kuhbier* s.n. (SEV 23659) (see also Luceño & Jiménez-Mejías 2006; sub *E. flavescens*).

Luceño & al. (2007) cite *Eleocharis flavescens*, a native from the New World, from the Portuguese provinces of Beira Litoral, Estremadura and Ribatejo. Achenes of this species are said to be “... de color oliváceo, púrpura obscuro o negro, [black]...”. Indeed, the achenes of *Eleocharis flavescens* are variably coloured and two varieties (distinct species

according to some authors) can be distinguished: var. *flavescens* with red-brown to dark brown achenes and var. *olivacea* (Torrey) Gleason (*Eleocharis olivacea* Torrey) with green to golden-brown achenes (see Smith & al. 2002). However, achenes are never black in this species and therefore at least part of the collections of supposed *Eleocharis flavescens* in the Iberian Peninsula could belong to another taxon. A revision of several Portuguese and Spanish collections of this species now has shown that part of them belong in fact to a similar species from the Old World tropics, *Eleocharis caduca*. Interestingly, the single Spanish collection of *Eleocharis caduca* (from 1971; see above) was identified as “*E. cf. caduca*” by K. Lewejohann but ascribed to *E. flavescens* by Luceño & Jiménez-Mejías (2006).

*Eleocharis caduca* and *E. flavescens* are obviously very closely related and belong to the same series *Maculosae* (Svenson 1929), and more precisely to the subseries *Ocreatae* (González-Elizondo & Peterson 1997). According to Svenson (l.c.) it “(...) is close to *E. olivacea* Torr. (...), differing (...) in the shiny black achenes (...)”. Indeed, apart from their distinct original distribution range (Old World versus New World respectively), the colour of the mature achenes seems to be the main (and possibly single reliable) feature to distinguish both species. In addition, their general habit provides a good character as well but this only holds true for the races of both species thus far encountered in the Iberian Peninsula. *Eleocharis caduca* is a small (the tallest specimens seen from Portugal do not exceed 10 cm) densely caespitose species with numerous, stiff culms that are dark reddish (wine-coloured) at base (much contrasting with the green upper part), a habit perfectly illustrated by Luceño & al. (2007; Lám. 22, fig, sub *E. flavescens*). *Eleocharis flavescens*, on the contrary, usually is a rhizomatous, not caespitose perennial with relatively fewer, longer and often more flexible culms (as illustrated by Vasconcellos & Franco 1958, sub *E. obtusa*). However, this only applies to Iberian Peninsula populations. The general habit of New World populations of *Eleocharis flavescens* (including the type!) is often very similar to that of typical *E. caduca*. In NW-Italy rice field populations of *Eleocharis flavescens* are identical with those from Portugal but plants from heaths closely resemble *E. caduca* in general habit (F. Verloove, pers abs.). Consequently, both species seem to differ only in achene colour and their original geographic distribution. Hence, it is doubtful that both taxa should be separate at specific level. The binomial *Eleocharis caduca* having priority, a lower taxonomic rank for *E. flavescens* (preferably as a subspecies), seems to be appropriate.

Outside tropical Africa *Eleocharis caduca* is also known from Egypt and Crete, doubtlessly as a naturalized introduction. Greuter & al. (2002) considered it as apparently extinct in Italy where it was fairly recently rediscovered near Viareggio in Tuscany (e.g. Lastrucci & Becattini 2007).

Genuine *Eleocharis flavescens* has been confirmed from the following localities in the Iberian Peninsula: Portugal, Baixo Alentejo: Grândola, Comporta, arrozal, esquadar 16, 12-IX-1956, *Vasconcellos* 56129 (LISI); Grândola, Comporta, arrozal, esquadar 9, 12-IX-1956, *Vasconcellos* 56149 (COI, LISI) (see also Vasconcellos & Franco; sub *E. obtusa*); Alcacer do Sal, Herdade do Pinheiro, VII-1961, *Costa J.B.* s.n. (LISI); Portugal, Ribatejo: Chamusca, Ulme, Casal de Paires, 6-VIII-1980, *Espirito Santo D. & Rosa M.L.* s.n. (LISI). Consequently, Baixo Alentejo has to be added to the distribution area of *Eleocharis flavescens* given by Luceño & al. (2007) for the Iberian Peninsula.

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