Short note

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First appointment of the invasive *Cyperus eragrostis* (*Cyperaceae*) as an established species in Tunisia

Abstract

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The South American weed *Cyperus eragrostis* Lam. (*Cyperaceae*) is reported for the first time in the wild from Tunisia, North Africa. A brief description of the species is given and it is illustrated in its Tunisian habitat. Its actual distribution is presented and discriminatory characteristics as compared to *C. flavescens*, a native species with which it has been confused for some time, are commented.

Key words: alien plant; *Commelinids*; Monocots; North Africa; *Poales*.

Introduction

Cyperus eragrostis Lam. (*Cyperaceae*) is one of the earliest known alien *Cyperus* species in the European flora. It was initially introduced as a gardening plant in the middle of the 19th century. Its invasion history and distribution were summarized by Petřík (2003) and Verloove (2006). At present, *C. eragrostis* occurs in many countries in South, West and Central Europe and partly also in the Balkan Peninsula (Verloove 2014; Verloove & al. 2014; Stoyanov & Barzov 2018).

In continental North Africa, the genus *Cyperus* is represented by 22 and 15 species in Algeria and Morocco respectively but only by 11 species in Tunisia where *C. eragrostis* has not been recorded so far (Carine & al. 2006; Jiménez-Mejías & Luceño 2011; Bouldjedri & al. 2011; Khabbach & al. 2020; APD 2021).

As part of the ongoing study on the Tunisian Monocots s. lat. (see e.g. El Mokni 2018a, 2018b; El Mokni & Domina 2018a, 2018b; El Mokni & Verloove 2017, 2019a, 2019b; El Mokni & Hadj Khalifa 2020), field surveys revealed a naturalized population of *C. eragrostis*, thus representing its first record in Tunisia. Given the species' invasive attributes, this likely will be the precursor of a wider naturalization in the area. Therefore, morphological notes, data on its habitat, as well as its actual distribution are here presented.

Material and methods

In the summer (July-August) of 2016, during botanical field surveys along and around some ponds and streams within Kroumiria region (NW of Tunisia), an unknown species of *Cyperus* was collected at El Houamdia near the village of Bouhertma (Fernana). Initially, it was erroneously identified as an unusually tall specimen of *C. flavescens* L., a native species that may be found in such habitats and that looks similar. Subsequently, after detailed examination of the glumes, it was correctly identified as *C. eragrostis*, a non-native species not previously recorded in Tunisia. Further field surveys were carried out in the summers of 2017, 2018 and 2020 in the same area and these have confirmed the persistence of *C. eragrostis* in Tunisia. Locally, it behaves like a naturalized species. A revision of herbarium specimens (in the personal herbarium of R. El Mokni) has confirmed this assumption, demonstrating that the oldest record of this species in Tunisia from this same locality dates back already to 2008.

GPS coordinates and altitude for sites are derived from Google Earth® (projected coordinate system WGS84).

The general distribution of *Cyperus eragrostis* has been summarized mainly according to the following works: Flora Europaea (DeFilipps 1980: 286), Flora d'Italia (Pignatti 1982: 696), Petřík (2003), Verloove (2006), Dakskobler & Vreš (2009), Verloove (2014), Stoyanov & Barzov (2018), the Euro+Med PlantBase (2021) and the African Plant Database (APD, 2021). Voucher herbarium specimens from El Houamdia (Bouhertma; Fernana) are preserved in the personal herbarium of R. El Mokni at the Faculty of Pharmacy of Monastir (Herb. Univ. Monastir, not listed in Index Herbariorum) and others were deposited in the herbarium of Meise Botanic Garden, Belgium (BR).

Taxonomic notes

Cyperus eragrostis and *C. flavescens* are morphologically similar and have been confused in Tunisia. Both have a simple or seldom compound 3–6 (–10)-rayed umbel, with ± globose spikes, 1–3 cm in diameter; densely clustered spikelets, close together in slightly furnished heads, oblong, distinctly flattened, 5–20 × 2–3 mm, 10–30-flowered; glumes navicular, distichous, imbricate, oval-obtuse scales. However, *C. eragrostis* is essentially distinguished by its glume characters: these are medially 2-keeled, laterally greenish, off-white to light-brown, with one inconspicuous white vein and a conspicuously isodiametric-reticulate surface; the species moreover is a coarse perennial and its styles are 3-fid. *C. flavescens*, in turn, is a slender annual, rarely exceeding 30 cm with fibrous root. Its glumes are golden yellow, its nutlet surface has transverse, whitish undulations and indistinct longitudinally elongate cells. Its stigmas are always 2-fid.

Distribution in the native and invaded area

Cyperus eragrostis is native to South America. Bryson & al. (1996: 507–508) report the species from Argentina, Bolivia, Brazil, Chile, Peru (cf. also Brako & Zarucchi 1993: 393), Surinam, Uruguay, Juan Fernández Islands and Easter Island (former Isla de Pascua) and

Fig. 1. Morphological characters of *Cyperus eragrostis* in Northwestern Tunisia. A: Plant in its habitat on the banks of Bouhertma river. Culms are obtusely trigonous; B. Inflorescence with several umbels composed of 5–10 rays. Each ray bears densely crowded, compressed spikelets. All photographs were taken by R. El Mokni in Fernana (NW of Tunisia), 30 July 2018.

Mexico (Tucker 1994). In North America the species was introduced into many states (see e.g. Bryson & al. 1996; Kartesz & Meacham 1999). Adventive occurrences are recorded for Tahiti and Cape Land (Kükenthal 1935–1936), New Zealand (Healy & Edgar 1980: 186; Johnson & Brooke 1989: 96), Queensland in Australia (Sharpe, 1986 sec. Clement & Foster, 1994), Canary Islands, Azores and Madeira (Coste 1906; Hohenester & Welß 1993: 311). Egorova (2000: 10) recently reported it from the W Caucasus. See also Verloove (2014) for more details.

In Europe, *C. eragrostis* is included in many handbooks and encyclopedias on gardening and house plants (Grounds 1979: 190; Walters & al. 1984: 115) and at present the nursery trade probably indeed represents the species' main vector of introduction and dispersal. The earliest recorded occurrence in Europe is from Hamburg (1854), although even older reports exist for the 1840s (Nyman 1889). Further early records are known from Northern Spain (since 1857), Western England (1876), Portugal (1877), Belgium (1896), the Netherlands (1913), Switzerland and Hungary (1914), Montenegro (1915) and Northwestern Italy (1934) (see e.g. Walters & al. 1984; Petřík 2003). Actually, in Italy the species occurs in almost all the administrative regions (Domina & al. 2018; Galasso & al. 2018).

In continental North Africa, the exact mode of introduction of *C. eragrostis* is unknown. The species apparently is a relatively recent introduction, only known from a few localities in Morocco (Carine & al. 2006; Khabbach & al. 2020) and Algeria (Bouldjedri & al. 2011).

Occurrence in Tunisia

Cyperus eragrostis is first recorded from Tunisia in the present paper. The species is found since 2008 in the Kroumiria region (NW of Tunisia) where it is growing along the main stream across El Houamdia (Coordinates 36°40'37" N, 08°44'47" E, alt. 225 m a.s.l., Bouhertma; Fernana) in the summer season. At present, the species is well established and is part of the summer floristic vegetation of tributaries within the dam of Bouhertma in the region. Main co-occurring species are: *Dittrichia viscosa* (L.) Greuter subsp. *viscosa*, *Heliotropium supinum* L., *Mentha pulegium* L., *M. suaveolens* Ehrh. subsp. *suaveolens*, *Potamogeton natans* L., *Xanthium spinosum* L., *X. strumarium* L., etc.

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