Article

Fl. Medit. 29: 45-53
https://doi.org/10.7320/FlMedit29.045
Version of Record published online on 8 April 2019

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New records, distribution and taxonomic notes for non-native vascular flora of Tunisia – I. *Poaceae*

Abstract

El Mokni, R. & Verloove, F.: New records, distribution and taxonomic notes for non-native vascular flora of Tunisia – I. *Poaceae*. — Fl. Medit. 29: 45-53. 2019. — ISSN: 1120-4052 printed, 2240-4538 online.

Six new taxa of the *Poaceae* family are added to the non-native flora of Tunisia: *Cenchrus longisetus* M. C. Johnst., *Digitaria ciliaris* (Retz.) Koeler, *Eleusine indica* (L.) Gaertn., *Eragrostis cilianensis* subsp. *thyrsiflora* (Willk.) H. Scholz & Valdés, *Eragrostis pilosa* (L.) P. Beauv. and *Paspalum dilatatum* Poir. Five of them are considered naturalized and horticultural trade is considered the most likely pathway for their introduction, whereas *Eragrostis pilosa* (L.) P. Beauv., might have been introduced as impurity in cereals for field crops. Populations of Tunisian *E. pilosa* are characteristic in possessing glandular pits, especially on inflorescence branches, a character not observed in *E. pilosa* s. str. in Europe and the Mediterranean area. Actual distribution and taxonomic notes are also given for all newly reported reported taxa.

Key words: chorology, *Cenchrus*, *Digitaria*, *Eleusine*, *Eragrostis*, *Paspalum,* North Africa.

Introduction

Interest on alien terrestrial flora in Tunisia has grown rapidly in the last two decades, with many new alien species having been reported (see e.g., El Mokni & El Aouni 2011a, 2011b, 2012, 2013, El Mokni & al. 2012, 2013, 2016; Sayari & al. 2016). Still, information on alien plants is incomplete and frequently updated with new records (see e.g., Iamonico & El Mokni 2016, 2017a, 2017b; El Mokni & Verloove 2017; El Mokni & Domina 2017, 2018, El Mokni & Véla 2017). According to recent research, more than 10 alien species were added to Tunisian terrestrial flora (see e.g., El Mokni 2018; El Mokni & Iamonico 2018). Despite the rather small size of the country (163,610 km²), the flora of Tunisia belongs to two major floristic subdivisions of the World (Takhtajan, 1986): Mediterranean Region (South Mediterranean province) encompassing the major part of the country, and Saharo-Arabian Region (Saharan province) that includes the southernmost part.

In the framework of the extensive field surveys aiming at updating and improving the knowledge on the Tunisian vascular flora, mainly focused on the coastal regions, many small populations of naturalized plants within the *Poaceae* were found within

coastal plant communities. *Cenchrus longisetus* M. C. Johnst., *Digitaria ciliaris* (Retz.) Koeler, *Eleusine indica* (L.) Gaertn., *Eragrostis cilianensis* subsp. *thyrsiflora* (Willk.) H. Scholz & Valdés, *Eragrostis pilosa* (L.) P. Beauv. and *Paspalum dilatatum* Poir.) are here reported for the first time from the country.

Materials and Methods

The work is based on extensive field surveys, analysis of literature, and examination of the specimens kept in the Herbarium of the Botanic Garden Meise, Belgium (BR) (acronym according to Thiers 2019+), and in the personal collection of one of the authors (R. El Mokni) which is deposited in the Herbarium of the Faculty of Pharmacy of Monastir and of the personal Herbarium of El Mokni. Reported taxa are presented alphabetically.

Results and Discussion

Cenchrus longisetus M. C. Johnst.
= *Pennisetum villosum* R. Br. ex Fresen.

Distribution and habitat

Originating from East Africa (Eritrea, Ethiopia, and Somalia), *C. longisetus* was introduced for ornament, widely used in public landscaping and became naturalized in the Mediterranean region (see i.e., Sommier & Caruana Gatto 1915; Domina & al. 2018; Galasso & al. 2018). It is increasing as a result of global warming (Fried 2012). Outside Europe, its invasiveness is widely recognized and it has naturalized in many warm parts of the world including America, Australia, and South Africa. In North Africa, *C. longisetus* was known so far in Morocco and Algeria as naturalized alien, whereas in Egypt it is noted as widely cultivated taxon (Valdés & Scholz 2009). It is here reported for the first time from Tunisia where it occurs since many years as naturalized weed in open grasslands and at some points alongside the railway leading to the Manzil Bourguiba city from Bizerta town.

Notes

This species is best recognized by its very showy inflorescences. These are whitish, plume-like, and the spikelets have tufts of silky hairs.

Examined specimens (new records)

TUNISIA: Bizerte (Center-Ville, N-E of Tunisia), 37°16’16” N, 09°52’41” E, 3 m a.s.l. 22 November 2010, *R. El Mokni* (Herb. Univ. Bizerta); Bizerte (Bab-Mateur, N-E of Tunisia), 37°15’55” N, 09°51’28” E, 4 m a.s.l. 23 September 2011, *R. El Mokni* (Herb. Univ. Bizerta); Bizerte (Sekma, N-E of Tunisia), 37°15’54” N, 09°51’13” E, 13 m a.s.l. 26 March 2013, *R. El Mokni* (BR, Herb. Univ. Bizerta).

Digitaria ciliaris (Retz.) Koeler

Distribution and habitat

Digitaria ciliaris is a weedy species, found in open, disturbed areas in most warm temperate and tropical regions of the world. Although still often overlooked, it is now known as a naturalized alien in many parts of southern Europe (cfr. Wilhalm 2009 for an extensive overview). In some areas, for instance in the Canary Islands, it is much more frequent than the related and very similar *Digitaria sanguinalis* (L.) Scop. Surprisingly, it is still hardly known in northwestern Africa where it may have been overlooked (cfr. Verloove 2016). In North Africa, it was reported for the first time from Algeria in 2007 (Zeddam & Scholz 2007), although it was shown subsequently to have been present in Morocco since at least 1947 (Verloove 2016). It is here reported for the first time from Tunisia where it occurs as widely naturalized weed in many plantation lots, annual cultivated areas, ornamental pots and plant nurseries.

Notes

Digitaria ciliaris has inflorescences on a long culm, usually much taller than the foliage, consisting of 2-9 racemes that are 5-10(-15) cm long. It has smooth marginal nerves of lower lemmas, without minute spines or with very few spinules in the upper one-third, a lower glume usually longer than 0.2 mm and upper surface of leaves usually glabrous or with some long-scattered hairs near base. *D. sanguinalis*, in contrast, has marginal nerves of lower lemmas with minute spinules, more or less throughout, lower glume usually shorter than 0.2 mm and upper side of leaves usually hairy throughout (rarely glabrous) (cfr. Verloove 2016).

Examined specimens (new records)

TUNISIA: Bizerte (Center-Ville, N-E of Tunisia), 37°16’16” N, 09°52’41” E, 3 m a.s.l. 22 November 2015, *R. El Mokni* (Herb. Univ. Bizerta); Bizerte (Route Panoramique, N-E of Tunisia), 37°18’48” N, 09°51’47” E, 17 m a.s.l. 24 December 2016, *R. El Mokni* (BR, Herb. Univ. Monastir); Bizerte (Av. Habib-Bourguiba, N-E of Tunisia), 37°16’12” N, 09°52’01” E, 10 m a.s.l. 24 December 2016, *R. El Mokni* (BR, Herb. Univ. Monastir).

Eleusine indica (L.) Gaertn.

Distribution and habitat

Eleusine comprises about 10 species, distributed in the tropical and subtropical parts of the world (De Wet 2006). This genus is represented by two neophyte taxa in Europe – *E. indica* and *E. tristachya* (Lam.) Lam. (Hansen 1980; Nikoli 2009). *E. indica* (Crow’s foot grass) is widespread throughout tropical and sub-tropical regions of the world. It has an African origin (Phillips 1972), although an alternative view states it was originally native to India (Holm & al. 1977; Holm & al. 1979; Waterhouse 1993). It is widely naturalized throughout the tropics, sub-tropics and temperate regions of the world, including Africa, Asia, SE Asia, Australia, the Pacific and the Americas (Waterhouse 1994).

In North Africa, *E. indica* was known so far as alien from Morocco, Algeria, Lybia and Egypt (Valdés & Scholz 2009). It is here reported for the first time from Tunisia where it occurs as a weed in irrigated public gardens, sidewalks, lawns, etc.

Notes

Eleusine indica is a variable species that is treated here in its traditional sense. Recent studies have suggested that *E. indica* subsp. *africana* is closer to *E. coracana* (L.) Gaertn. and is best subsumed under that species (as *E. coracana* subsp. *africana* (Kenn.-O'Byrne) Hilu & de Wet) (Hilu & Johnson 1997) or even considered a distinct species (*E. africana* Kenn.-O'Byrne; Peterson & al. 2015). Both are separated on spikelet size, glume nervation and shape and ornamentation of the seed. However, although typical plants of both taxa are easily distinguished, intermediate plants are often encountered and their separation therefore is rarely straightforward. This also applies to at least part of the material seen from Tunisia.

Examined specimens (new records)

TUNISIA: Ile de Djerba, Houmt Souk., within city, neglected area, 28 August 2005*, J. Lambinon* 05/Tu/628 (BR, LG); Nabeul (Hammamet-Sud, Cap-Bon, N-E of Tunisia), 36°24'34" N, 10°34'35" E, 10 m a.s.l., 21 December 2008, *R. El Mokni* (Herb. Univ. Bizerta); Ariana (Sokra, N-E of Tunisia), 36°50'06" N, 10°09'59" E, 33 m a.s.l., 07 August 2011, *R. El Mokni* (Herb. Univ. Bizerta); Bizerte (Route Panoramique, N-E of Tunisia), 37°19'24" N, 09°51'31" E, 38 m a.s.l., 03 September 2013, *R. El Mokni* (Herb. Univ. Bizerta); Bizerte (Bab-Mateur, N-E of Tunisia), 37°16'07" N, 09°52'05" E, 6 m a.s.l., 18 October 2013, *R. El Mokni* (Herb. Univ. Bizerta); Medenine (Jerba, S-E of Tunisia), 33°52'28" N, 10°51'39" E, 8 m a.s.l., 17 December 2014, *R. El Mokni* (Herb. Univ. Bizerta); Monastir (Centre-Ville, C-E of Tunisia), 35°46'16" N, 10°49'52" E, 15 m a.s.l., 23 December 2015, *R. El Mokni* (BR, Herb. Univ. Monastir); Nabeul (Hammamet-Sud, Cap-Bon, N-E of Tunisia), 36°26'26" N, 10°42'25" E, 10 m a.s.l., 17 January 2017, *R. El Mokni* (Herb. Univ. Monastir); Bizerte (Route Corniche-Kheyam, N-E of Tunisia), 37°19'31" N, 09°51'52" E, 6 m a.s.l., 22 January 2017, *R. El Mokni* (BR, Herb. Univ. Monastir).

Eragrostis cilianensis subsp. ***thyrsiflora*** (Willk.) H. Scholz & Valdés

Distribution and habitat

Originating from southern Europe, *E. cilianensis* was introduced in southern Canada, U.S.A, Mexico, Central America, Caribbean, Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela (Peterson 2001; Peterson & Boechat 2001). It has widely spread to other tropical and temperate areas around the world: South, East and Central Europe, North Africa, tropical and southern Africa, South-west islands of the Indian Ocean, West Asia and Arabian Peninsula, India and Pakistan, China, South-east Asia, Indonesia and Australia (Holm & al. 1977; Holm & al. 1997). *E. cilianensis* subsp. *thyrsiflora*, in contrast, was known so far only in France and Spain as native taxon with no reports for North Africa (Valdés & Scholz 2009). It is here reported for the first time from

Northern Africa where it occurs as a weed in cultivated lands of the Bizerta region in Northeastern Tunisia.

Notes

E. cilianensis is best recognized by its ovate panicle, 4-30 cm long, fairly dense, contracted, stiffly branched, usually with glands on pedicels and branchlets; crateriform glands on the leaf-margins and the rather stiff panicles of yellowish green or leaden grey spikelets. It closely resembles *E. minor* Host and both may intergrade. The latter usually has a less dense inflorescence, single-veined upper glumes (vs. 3-veined), narrower spikelets with less numerous florets and a more or less elliptical to ovoid caryopsis (vs. nearly orbicular). Subsp. *thyrsiflora* is distinguished from the nominal taxon by spikelets that are much elongated with more numerous florets (spikelets more than 16 mm long with 24-60 florets, vs. less than 16 mm long with 22-30 florets; Portal 2002).

Examined specimen (new record)

TUNISIA: Bizerta (Ghar El-Melh, N-E of Tunisia), 37°09'50" N, 10°08'26" E, 10 m a.s.l., 22 March 2015, *R. El Mokni* (BR, Herb. Univ. Monastir).

Eragrostis pilosa (L.) P. Beauv.

Distribution and habitat

E. pilosa is native to Europe, naturalized in North, Central, and South America (excluding Surinam). It occurs in disturbed habitats, often in wet sandy soils, along forest margins in sandy or gravelly sites and city sidewalks (Giraldo-Cañas & al. 2012). It is mostly found in coastal countries worldwide, but not in cooler northern temperate areas. It is widespread in Africa and temperate Asia, and naturalized in Australia and the Americas. In tropical Asia, it occurs in India, Indochina, Indonesia, Malaysia, Myanmar, Nepal, Pakistan and Sri Lanka. In Europe, it has been reported as a weed in, for instance, Albania, Austria, Bulgaria, Czechoslovakia, France, Germany, Greece, Hungary, Italy, Portugal, Romania, Russian Federation (European part), Spain, Switzerland, Ukraine and former Yugoslavia (Holm & al. 1997). In North Africa, *E. pilosa* was known so far in Morocco, Algeria, Lybia and Egypt (Valdés & Scholz 2009). It is here reported for the first time from Tunisia where it occurs as a weed in open grasslands subjected to excessive grazing of the Monastir region.

Notes

E. pilosa belongs to the *E. pectinacea-pilosa* group (Scholz 1996), a complex assemblage of variable, closely similar species. All are annuals with non-disarticulating rachillas, rounded or dorsally slightly compressed caryopses and micro-hairs in which the basal cell is only 0.8-1.6 times the length of the apical cell (Koch 1974). The plants recently found in Tunisia are very characteristic in possessing few to many glandular pits, especially on inflorescence branches, a character not observed in *E. pilosa* s. str. in Europe and the Mediterranean area. Within the *E. pectinacea-pilosa* complex this feature is encountered in three taxa: the North American *E. perplexa* Harvey, the Asian *E. amurensis* Probatova (syn.: *E. voronensis* Scholz) and the predominantly African *E. pilosa* subsp. *neglecta* Scholz (Scholz 1988, Seregin 2012). Tunisian plants correspond rather well with the latter,

a taxon known from Niger, Sudan and Pakistan but probably present elsewhere in the Sahel in Africa. The taxonomic value of the presence of glandular pits in *E. pilosa* and related species is unknown. According to Scholz (1988) they are never present in *E. pilosa* s. str., while other authors accept that they can be present in small number (e.g. Giraldo-Cañas & al. 2012). Further study is required, preferably using molecular techniques. For this reason, and at least for the time being, the Tunisian populations are assigned to *E. pilosa* s. l.

Examined specimens (new records)
TUNISIA: Monastir (Zeramdine-Ridène, C-E of Tunisia), 35°36'28" N, 10°41'52" E, 33 m a.s.l., 06 November 2016, *R. El Mokni* (BR, Herb. Univ. Monastir); Monastir (Jemmel-Birettayeb, C-E of Tunisia), 35°37'44" N, 10°44'37" E, 20 m a.s.l., 28 November 2016, *R. El Mokni* (Herb. Univ. Monastir).

Paspalum dilatatum Poir.

Distribution and habitat
P. dilatatum is a tufted perennial with short rhizomes and is of South American origin. It is introduced and naturalized in many Mediterranean countries (Clayton in Tutin & al. 1980). In North Africa, *P. dilatatum* was known so far in Morocco, Algeria and Egypt (Zeddam & Scholz 2007; Valdés & Scholz 2009). It is here reported for the first time from Tunisia where it occurs as a weed on the edges of certain non-permanent streams in the north-west and on coastal dunes immersed from time to time by waste water in the region of Bizerte.

Notes
Characteristic features of *P. dilatatum* are racemes 3-7(10), alternate, 6-8 cm long, axils of racemes pilose. Spikelets are obtuse, 3-4 mm long. Upper glume and lower lemma have a marginal fringe of relatively long white hairs (1.5-2 mm long).

Examined specimens (new records)
TUNISIA: Jendouba (Tabarka-Houamdia, N-W of Tunisia), 36°56'15" N, 08°47'31" E, 6 m a.s.l. 03 February 2012, R. El Mokni (Herb. Univ. Bizerta); Bizerte (Route Corniche-Sidi Salem, North-East of Tunisia), 37°17'21" N, 09°52'27" E, 1 m a.s.l. 19 August 2014, *R. El Mokni* (Herb. Univ. Bizerta).

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