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TITLE: Two new naturalized species of the genus *Cyperus* (Cyperaceae) from Turkey

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PAGES: 35-38

ORIGINAL PDF URL: <http://ofd.artvin.edu.tr/tr/download/article-file/469358>

Two new naturalized species of the genus *Cyperus* (Cyperaceae) from Turkey

Türkiye *Cyperus* (Cyperaceae) cinsine iki yeni kayıt

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Eser Bilgisi / Article Info

Araştırma makalesi / Research article

DOI: 10.17474/artvinofd.333093

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Geliş tarihi / Received

07.08.2017

Düzeltilme tarihi / Received in revised form

19.12.2017

Elektronik erişim / Online available

15.02.2018

Keywords:

Biodiversity

Cyperacea

Cyperus

Turkey

New records

Anahtar kelimeler:

Biyoçeşitlilik

Cyperaceae

Cyperus

Türkiye

Yeni kayıt

Abstract

Cyperus eragrostis and *C. microiria* were recorded for the first time from Turkey in this study. Descriptions of the taxa were improved. Morphological characteristics of these species were investigated. Geographical distributions and IUCN threat categories of these species were reported.

Özet

Cyperus eragrostis ve *C. microiria* türleri Türkiye'den ilk kez bu çalışmada kayıt edilmiş. Türleri a morfolojik karakterler araştırılarak taksonların tür tanımları geliştirilmiştir. Aynı zamanda türleri coğrafik yayılışları ve IUCN tehlike kategorileri de bu çalışma kapsamında verilmiştir.

INTRODUCTION

Cyperaceae with 104 genera and 5000 species is the third largest family among the magnoliophyta (after Orchidaceae and Poaceae) in the world (Goetghebeur 1998; Lunkai et al. 2000; Ball et al. 2002). The genus *Cyperus* L., which is the second biggest genus of the Cyperaceae family, has approximately 600 species on Earth (Kükenthal 1936). In Turkey, it has 21 species according to the records of Flora of Turkey written by Davis and Oteng-Yeboah (1985). Finally, 21 taxa belonging to the genus *Cyperus* were reported in Checklist of the Flora of Turkey (Güner 2012). The number of taxa belonging to the genus *Cyperus* in our country increased to 13 by two taxa additions made by Byfield (2000). In this study, *C. eragrostis* and *C. microiria* which have not spread in Turkey according to the literature records have

been confirmed presence in our country. Also, these species were investigated by evaluating morphological, and contributed to descriptions of these species.

MATERIAL AND METHODS

Specimens were collected during project by Erciyes University Research Fund (FDK-20134695 and deposited in the Erciyes University Herbarium (ERCH). Morphological specimens were examined under stereo microscope.

RESULTS

New Records for Turkey

Cyperus eragrostis Lam., Tabl. Encycl. Méth. Bot 1:146. 1791. Figure 1.

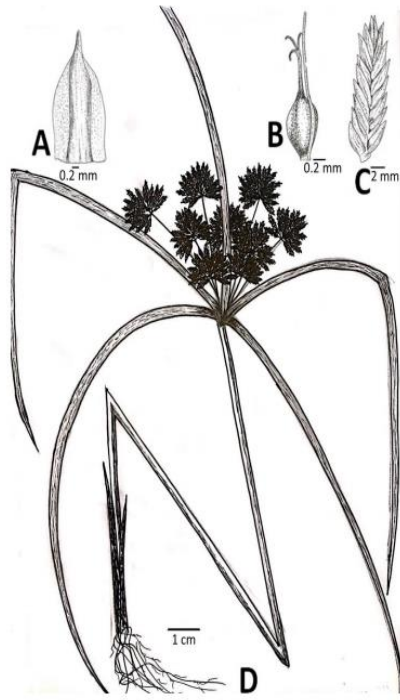


Figure 1. *Cyperus eragrostis* hand drawing; A) Glume, B) Ovary, C) Spikelet, D) General appearance (Photo: N. ŞAPCI 2016).

Type: Described from Tropical South America.

- = *Chlorocyperus eragrostis* (Lam.) Rikli, Jahrb. Wiss. Bot. 27: 563 (1895).
- = *Cyperus declinatus* Moench, Methodus: 317 (1794).
- = *Cyperus monandrus* Roth, Catal. Bot. 1: 3 (1797).
- = *Cyperus vegetus* Willd., Sp. Pl. 1: 283 (1797), nom. superfl.
- = *Cyperus ochrocephalus* Steud., Flora 25: 601 (1842).
- = *Cyperus prionotropis* Steud., Flora 25: 601 (1842). 99
- = *Cyperus vegetus* var. *compactus* Desv. in C.Gay, Fl. Chil. 7: 167 (1853).
- = *Cyperus luzulae* Hochst. ex Steud., Syn. Pl. Glumac. 2: 25 (1854), nom. illeg.
- = *Cyperus vegetus* var. *triangularis* Boeckeler, Flora 42: 436 (1859).
- = *Cyperus gracilis* Buchanan, Trans. & Proc. New Zealand Inst. 3: 210 (1871), nom. illeg.
- = *Cyperus serrulatus* S.Watson, Proc. Amer. Acad. Arts 17: 382 (1882), nom. illeg.
- = *Cyperus eragrostis* var. *spectabilis* Makino, Bot. Mag. (Tokyo) 6(60): 47 (1892), nom. nud.
- = *Cyperus lutescens* Phil., Anales Univ. Chile 93: 345 (1896), nom. illeg.

- = *Cyperus vegetus* var. *obtusangulus* Kuntze, Revis. Gen. Pl. 3(2): 334 (1898).
- = *Cyperus vegetus* var. *trigonus* Kuntze, Revis. Gen. Pl. 3(2): 334 (1898).
- = *Cyperus vegetus* var. *limbata* C.B.Clarke, Beibl. Bot. Jahrb. Syst. 68: 12 (1901).
- = *Cyperus declinatus* var. *limbatus* Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 5: 311 (1919).
- = *Cyperus eragrostis* f. *rubromarginatus* Kük., Acta Horti Gothob. 5: 33, 107 (1929 publ. 1930).
- = *Cyperus eragrostis* var. *compactus* (Desv.) Kük. in H.G.A.Engler (ed.), Pflanzenr., IV, 20(101): 179 (1936).
- = *Cyperus eragrostis* f. *latifrons* Kük. in H.G.A.Engler (ed.), Pflanzenr., IV, 20(101): 179 (1936).
- = *Cyperus eragrostis* f. *tener* Kük. in H.G.A.Engler (ed.), Pflanzenr., IV, 20(101): 179 (1936).

Perennial. Rhizome short, 1.2-3 mm diameter, thick, tubers absent. Stem 25-115 cm, trigonous, 2-4 mm diameter, glabrous, solitary. Leaves subbasal, linear, acuminate, smooth, 2-10 mm broad, shorter than stems. Sheaths brown, up to 22 mm. Inflorescence simple or compound umbel of dense head. Rays 3-6, up to 15 cm. Bracts 5-11, similar to leaves. Spikelets 5-13 cm x 1-3 mm, lanceolate, subacute, 8-12 flowered. Rhachilla not winged, inarticulated, smooth. Glumes 1-3 mm x 0.7-1.5 mm, lanceolate or ovate-lanceolate, acuminate, straw or yellowish-red colored, a greenish centre. Stamen 1. Stigma 3. Nut trigon, 1.06 x 0.57 mm, greyish.

Phenology: Flowers and fruits from June to August.

Habitat: Swamp areas, rice fields, and moist places, riverside.

Conservation Status: *Cyperus eragrostis* is restricted to a few localities in Black Sea region in Turkey at altitudes of 0-200 m. At the international level, this species is evaluated as Least Concern (LC) since it also grows in Germany, Austria, South East Asia, France, UK, Ireland, Spain, Sweden, Canary Islands, North and South America, Poland, Portugal, Slovakia, New Zealand, Yugoslavia (IUCN, 2017).

Examined specimens: Turkey, Samsun: Çarşamba, Yeşilirmak river side, 1.6 m, 41°12'245"K, 36°43'648"D, 25 viii 2014, HS1365, ERCH (Figure 2).

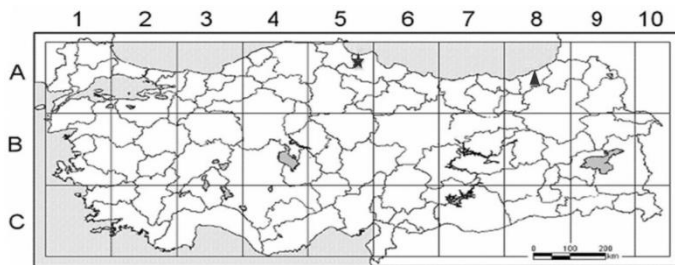


Figure 2. Distribution of *Cyperus microiria* (▲) and *C. eragrostis* (★) in Turkey.

Cyperus microiria Steud., Syn. Pl. Glumac. 2: 23 (1854), Figure 3.

Type: West Kentucky.

= *Cyperus parviflorus* Nees in R.Wight, Contr. Bot. India: 87 (1834), nom. illeg.

= *Cyperus iria* var. *parviflorus* Miq., Fl. Ned. Ind. 3: 270 (1856).

= *Cyperus textorii* Miq., Ann. Mus. Bot. Lugduno-Batavi 2: 141 (1866).

= *Cyperus amuricus* var. *textorii* (Miq.) Kük., Sinensia 3(3): 80 (1933).

= *Cyperus iria* var. *rectangularis* Kük. in H.G.A.Engler (ed.), Pflanzenr., IV, 20(101): 152 (1935).

= *Cyperus rectangularis* (Kük.) Bennet, Indian Forester 95: 692 (1969).

Annual. Rhizomes short, 1.2-3 mm broad, thick, tubers absent. Stems 20-60 cm, trigonous, 0.6-3 mm diameter, glabrous, solitary. Leaves sub basal, linear, acuminate, smooth, 1-6.2 mm broad, shorter than stems. Sheaths brown, up to 22 mm. Inflorescence compound umbel. Rays 4-11, up to 11 cm. Bracts 3-6, similar to leaves. Spikelets 6-10 cm x 1.3-2 mm, linear, acute, 18-30 flowered. Rhachilla winged, inarticulated, smooth. Glumes 1-2 mm x 0.9-1.8 mm, obovate, up to 0.3 mm, mucronate, yellowish-brown colored a greenish centre. Stamen 3. Stigma 3. Nut trigon, 1.27 x 0.63 mm, greyish.

Phenology: Flowers and fruits from August to October.

Habitat: Forest land, marshes, seaside, riverside.

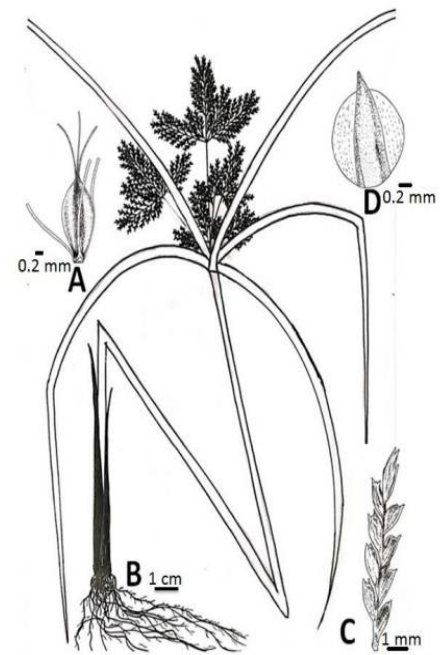


Figure 3. *Cyperus microiria* hand drawing; A) Ovary, B) General appearance, C) Spikelet, D) Glume (Photo: N. ŞAPCI 2016).

Conservation Status: *Cyperus microiria* is restricted to a few localities in East Black Sea region in Turkey at altitudes of 0-100 m. At the international level, this species is evaluated as Least Concern (LC) since it also grows in Italy, China, East Asia, North America (IUCN, 2001).

Examined specimens: Turkey, Rize: Çayeli, Büyükdere under the bridge, 15 m, 41°04'948"K, 40°42'778"D, 27 viii 2014, HS1390 (Figure 2).

Key to the Turkish species of *Cyperus*

1. Stigmas 2
 2. Inflorescence compound umbel.....*C. serotinus*
 2. Inflorescence capitate, terminal, lateral or pseudo-lateral
 3. Stamen 1; Inflorescence capitate, terminal; nut trigon
 4. Stem caespitose, creeping.....*C. michelianus*
 4. Stem solitary, erect.....*C. noeanus*
 3. Stamen 3; Inflorescence capitate, pseudo-lateral or lateral; nut lenticular
 5. Spikelets broadly lanceolate or ovate, obtuse; rhizomes very short.....*C. pannonicus*
 5. Spikelets oblong or oblong-lanceolate, acute; rhizomes usually very long, apparently horizontal creeping.....*C. laevigatus*
1. Stigmas 3
 6. Stem cylindrical.....*C. capitatus*
 6. Stem trigon
 7. Rhachilla not winged; Stamens 1 or 2
 8. Stamen 1; Perennial, Bracts 5-11*C. eragrostis*
 8. Stamen 2; Annual, Bracts 2-4

9. Glumes 0.5-0.8 mm, not mucronate; stem 20-75 cm*C. difformis*
9. Glumes 0.9-1.3 mm, mucronate, up to 0.1 mucro; stem 2-35 cm.....*C. fuscus*
7. Rhachilla winged; Stamen 3
10. Rhachilla articulated, zigzagging
11. Glume ovate-elliptic; nut lengths 1.30-1.8 mm.....*C. glaber*
11. Glume oblong-lanceolate; nut lengths 1-1.2 mm.....*C. congestus*
10. Rachilla inarticulated, smooth
12. Annual plant
13. Glumes linear-lanceolate, obtuse*C. glomeratus*
13. Glumes obovate, mucronate.....*C. microiria*
12. Perennial plant
14. Glumes pale yellow-yellowish brown, laxly imbricate arranged, deciduous at maturity; stolons softly-flexible, white.....*C. esculentus*
14. Glumes dark brown-reddish, strict, dense imbricate arranged, persistent at maturity; stolons rigid, dark brown.
15. Rhizomes c. 1 mm wide, slender; rays not more than 10 cm*C. rotundus*
15. Rhizomes c. 3-10 mm wide, thick; rays more than 10 cm*C. longus*

DISCUSSION

Cyperus eragrostis was first described by Lamarck in 1791 (www.theplantlist.org). *Cyperus eragrostis* is the closest species to *C. difformis* L. and *C. fuscus* L.. *Cyperus eragrostis* were separated by using the differences in stamen numbers from these species. Natural spreading areas of *Cyperus eragrostis* on Earth is in North and South America, Europe, South East Asia, Austria, New Zealand and has economic importance because it is used as animal feed and ornamental plant.

Cyperus microiria was first described by Steudel in 1854 (www.theplantlist.org). *Cyperus microiria* distributed in

East Asia, North America, China and Europe is the closest species to *C. congestus* Vahl and separated by using the differences in rachilla from this species.

As a result of the studies, *C. eragrostis* and *C. microiria* are identified as new records of Flora of Turkey and thus two new records are added to the genus *Cyperus* in Turkey. In consequence of the changes, the number of the genus *Cyperus* in Turkey has increased to 15. Moreover, a revised determination key for the Turkish taxa of *Cyperus* are provided in this study and contributed to descriptions of these species.

ACKNOWLEDGEMENTS This study was supported by Erciyes Research Fund Project (Project no: FDK-20134695).

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