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

*Türkiye Cyperus (Cyperaceae) cinsine iki yeni kayıt*

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**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 edilmiştir. Türlere ait morfolojik karakterler araştırılarak taksonların tür tanımları geliştirilmiştir. Aynı zamanda türlerin coğrafik yayılımları 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.
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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.

= *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 vegetus* var. *compactus* Desv. in C.Gay, Fl. Chil. 7: 167 (1853).
= *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.

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).
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Examined specimens: Turkey, Samsun: Çarşamba, Yeşilirmaksı 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 iria var. parviflorus Miq., Fl. Ned. Ind. 3: 270 (1856).
= Cyperus amuricus var. textorii (Miq.) Kük., Sinensia 3(3): 80 (1933).

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.

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
3. Inflorescence capitate, terminal, lateral or pseudo-lateral
4. Stamen 1; Inflorescence capitate, terminal; nut trigon
5. Stem caespitose, creeping........................................C. michelianus
6. Stem solitary, erect.....................................................C. noeuanus
7. Stamen 3; Inflorescence capitate, pseudo-lateral or lateral; nut lenticular
8. Spikelets broadly lanceolate or ovate, obtuse; rhizomes very short...............................................................C. pannonicus
9. Spikelets oblong or oblong-lanceolate, acute; rhizomes usually very long, apparently horizontal creeping........................................C. laevigatus
10. Stem cylindrical..............................................................C. capitatus
11. Stem trigon
12. Rhachilla not winged; Stamen 1 or 2
13. Stamen 1; Perennial, Bracts 5-11......................................C. eragrostis
14. Stamen 2; Annual, Bracts 2-4
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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 mm; stem 2-35 cm ..................................................... C. fuscus
7. Rhachilla winged; Stamen 3
10. Rhachilla articulated, zigzagging
11. Glume ovate-elliptic; nut lengths 1.3-1.8 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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