

NOTES ON CAREX (CYPERACEAE) SECT. GLANDESTINAE IN IRAN

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In this research, herbarium specimens and the newly collected specimens belonging to *Carex* sect. *Glandestinae* were studied. Among the investigated specimens, *Carex pediformis* C.A.Mey. subsp. *pediformis* is reported as a new record from Iran. It will be compared with its closest taxa. An identification key for section *Glandestinae*, is given. Geographical distribution and habitats are explained. Illustrations for the new taxon is given.

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Key words: *Cyperaceae*; section *Glandestinae*; *Carex pediformis*; Iran

نکاتی در مورد جنس *Carex* بخش *Glandestinae* در ایران

محمد امینی‌راد: مربی پژوهش بخش تحقیقات رستنی‌ها، مؤسسه تحقیقات گیاه‌پزشکی کشور.
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در این تحقیق، نمونه‌های هرباریومی موجود و نمونه‌های تازه جمع‌آوری شده متعلق به جنس *Carex* sect. *Glandestinae* مورد بازبینی قرار گرفتند. در بررسی نمونه‌ها *Carex pediformis* subsp. *pediformis* به عنوان گزارش جدید از ایران معرفی می‌شود. خصوصیات مورفولوژیکی گونه مذکور، مقایسه این گونه با دیگر گونه‌های بخش *Glandestinae* sect. به همراه کلید شناسایی گونه‌ها در این بخش ارائه شده است. در ضمن، پراکنش جغرافیایی، زیستگاه‌ها و تصاویر برای این یافته نیز آورده شده است.

INTRODUCTION

Carex L. is a genus with numerous species of grassy plants in the family Cyperaceae (sedges) which is known as the fifth big genus in the world (Frodin 2004). The genus is one of the most diverse and widely distributed plants, especially in the temperate regions of the Northern hemisphere. In addition, *Carex* is the largest genus of Cyperaceae family in Iran. Amini Rad (2011) has reported 57 species for the Flora of Iran. Furthermore, *C. diandra* Schrank (Amini Rad & Sharifi 2013), *C. iraqensis* Kukkonen & Hooper and *C. disticha* Huds. (Amini Rad 2013) have been recently reported from Iran. According to the new reports of the genus *Carex* from Iran, it seems that the number of species of the genus may be more than what is known by now.

In a taxonomic review of the genus *Carex* L., in Iran the existing herbarium specimens and the newly collected specimens belonging to sect. *Glandestinae*, were studied. An interesting species of this section from Iran was identified: *Carex pediformis* C.A. Mey. subsp. *pediformis*, is reported here for the first time for

the flora of Iran.

Carex digitata was the first report from this section from Iran by Boissier (1882). Kukkonen (1998) confirmed the mentioned species as the only representative of this group from Iran. Recently, Gholizadeh et al. (2010) reported *C. humilis* from Samamous Mountain (Alborz Mountains) from Iran.

MATERIALS AND METHODS

This study was conducted using collections of the following herbaria: the herbarium of Iranian Research Institute of Plant Protection (IRAN), the herbarium of Research Institute of Forests and Rangelands (TARI) and the herbarium of Payame Noor University of Sari. Identification, nomenclature surveys and distribution of the taxa were determined using Egorova (1999), Chater (1980), Govaerts et al. (2013), Jiménez-Mejías & Luceño (2011).

RESULTS AND DISCUSSION

Carex pediformis along with *C. humilis* and *C. digitata* belonging to sect. *Glandestinae* G. Din occur in Iran.

In this paper, description for species of sect. *Glandestinae* including *Carex pediformis* subsp. *pediformis*, *C. humilis* and *C. digitata*, distribution, habitat of the taxa, and identification key for sect. *Glandestinae* in Iran are presented.

Carex sect. *Glandestinae* G. Don in Loudon, Hort. Brit. 376 (1830).

Syn.: *Carex* sect. *Digitatae* (Fries) H. Christ, Bull. Soc. Bot. Belg. 24, 2: 13 (1885); *Carex* [unranked] *Digitatae* Fries.

Caespitose perennial. Leaves shorter than stem. Inflorescence with 2-6 spikes, terminal spike male, lateral spikes female; bracts with long sheath, blade indistinct, ten setaceous. Female glumes brownish or dark purple-brown, rarely greenish or yellow-green. Utricles obovate to obovate-oblong, densely pubescent, rarely glabrous, veinless or veined with 2 prominent marginal veins, with a short beak 0.2-0.5 mm or beakless. Stigmas 3.

Key to the species of sect. *Glandestinae* in Iran:

1. Stem 2-10 cm high. Leaves longer (3-5 times) than stem length. Female spikes are located all over stem; utricles 2-3 mm long *C. humilis*

- Stems 10-30 cm high. Leaves shorter or equal to stem length. Female spikes are located in upper half of the stem; utricles 3-5 mm long 2

2. Mountain plant. The male spike overtopping or sometimes shorter than the uppermost female spikes. Utricles 3-3.5 mm long, with stipe 0.3-0.6 mm; nuts 2.2-2.8 mm *C. pediformis*

- Forest plant. The uppermost female spike always overtopping male spikes. Utricles 3.5-5 mm long, with stipe 1-2 mm; nuts 3-3.5 mm *C. digitata*

Carex digitata L., SP. Pl. 2: 975 (1753).

Perennial, tufted, 10 to 30 cm tall. Rhizome almost vertical, sturdy. Stems 0.4 to 0.5 mm in diameter. Leaves equaling to stem length; old leaves sheaths covering branching tip of rhizome, in base of fertile shoots vinaceous, without or with reduced leaf blades; ligule 0.2 to 0.3 mm, arch as long as or slightly longer than the width of blade; blades 2.5 to 4.5 mm broad, flat, smooth or scabrous along margins and mid-nerve in lower surface. Inflorescence with 1 male spike and 1 to 2 female spikes upper than male spike; bracts short or frequently reduced to a blade-less sheath to 15 mm long. Male spike 7-17 x 1.5-2 mm, terete or clavate, brown; male glume c. 5 mm, obtuse with wide scarious margins, reddish-brown. Female spikes 10-20 x c. 4 mm, lax, erect, lower with peduncles to 20 mm; female glumes 3.5-5 x c. 2 mm, amplexicaul, obtuse to truncate, with ciliate aristae, light brown, margins wide scarious. Utricles 3.5-5 x c. 1.5 mm, obovoid, tightly

enveloping utricle, nerved, green or almost white to brown, hispid, stipe c. 2 mm, white; beak 0.3 to 0.6 mm long, cylindrical or conical, truncate or obscurely truncate. Stigma 3. Nut 3-3.5 x c. 1.5 mm, style base 0.5 mm, stipe c. 1.5 mm, trigonus, ellipsoid, brown, reticulate with a papilla in each areole.

Carex digitata, unlike the other species of this section, grows in Hyrcanian forests in low altitudes of Alborz Mountains (200-1100 m), while *C. humilis* and *C. pediformis* subsp. *pediformis* are present in alpine zones at an altitude of 2200-3400 m above sea level.

Specimens seen: Golestan: Gorgan, Tuscaestan, 1130 m, Amini Rad (38645-IRAN); Jangal Golestan, Gol Loveh, 700 m, Riedl & Ershad (19040-IRAN). Mazandaran: 12 km Kelardasht to Abbas Abad, 1080 m, Termeh, Matin & Tehrani (29341-IRAN); Nowshahr, Kheiroud Kenar, 450-1000 m, Amini Rad & Asef (57391-IRAN); Sari, Aghmashad, Bishe Dasht, 519 m, Gholipour & Ebrahimi (60617-IRAN). Gilan: Asalem to Khalkhal, 800-1000 m, Wendelbo & Assadi (27744-TARI).

Carex humilis Leysser, Fl. Halens. 175 (1761).

Perennial, green, tightly caespitose, with ligneous and short-branching rhizomes. Culms to 7 cm tall, yellowish green, terete to obtusely triangular, smooth. Leaves longer than the culm, reflexed; lower sheaths reddish-brown, fracturing-fibrillose; ligule to 0.1 mm, straight; blades 1-2 mm broad, slightly stiff, loosely strigose, flat or canaliculate, glaucescens. Inflorescence with one terminal male spike and 2-3 female spikes, remote; male spike clavate, 10-20 mm long, oblong, reddish brown; glumes to 8 mm long, blunt, brownish in midnerve area, margins broadly and often entirely hyaline. Female spikes 10-15 mm long, with loosely 2-4 flowers, the short geniculate peduncle enclosed in bracteole sheath; bract with sheath to 5-14 mm long, ferruginous and broadly hyaline above, spathe like; female glumes 3 to 4.5 mm long, ovate to broadly ovate, one nerved, mucronate, reddish brown, with a broad green medium band, with a fairly broad hyaline margin, equaling to slightly exceeding the utricle. Utricles 2-2.5 mm long, obovoid, convexly trigonous, finely pilose, yellowish-green, laterally 2-veined, base abruptly contracted into a short stipe, with short and truncate beak to 0.2 mm long. Stigmas 3. Nuts 1.7 mm long, trigonous, obovate, brown; style base swollen, yellowish-brown and persistent.

Specimens seen: Gilan: Rudsar to Ramsar road, Javaherdasht, Samamus Mountain, 2200-2300 m, Naqinezhad & Gholizadeh 1700; 2600 m, Gholizadeh & Naderi 1701; Amini Rad & Torabi (57350-IRAN).

Carex pediformis C.A.Mey., in Mém. Acad. Imp. Sci. St. Pétersbourg Sav. Etr. 1: 219 (1831).

-- subsp. *pediformis*

Perennial, caespitose. Stem 0.5-0.9 mm in diameter, trigonous, smooth or slightly scabrous above, at the margins depressed. Leaves shorter (1/3 to 1/2) than the stem length; sheaths 10-20 mm long; ligule c. 0.1 mm long, straight or slightly arched, at the apex ciliate; blades 1 to 2 mm wide, keeled, flat, at the margins revolute, scabrous on the keel and at the margins, on the upper surface scabrous. Inflorescence composed of one male spike and 1-3 female spikes, male spike at the top of inflorescence or sometimes lower than adjacent female spike; bracts shorter than their spikes, foliose or setaceous, with sheath 5-15 mm long. Male spike 5-10 x 1.5-3 mm, oblong, yellow-brown; male glumes 5-6 mm long, oblanceolate, yellow to brownish, at the apex and margins widely scarious. Female spikes 10-20 x 4-5 mm, cylindric, lax, pedunculate with 10-30 mm; female glumes 3-4.5 mm, obtuse, with 0.5 mm long mucro, at the apex and margins widely scarious, at the midnerve area reddish brown or brown and sometimes scabrous above. Utricles 3-3.5 x 1.2-1.5 mm, obovate, trigonous, pubescent, yellow-brown in upper and yellow at the base, with two main nerves and 1-2 short nerves; stipe 0.3-0.6 mm; beak 0.2-0.3 mm, scabrous, with bidentate and slightly oblique ostiole. Stigmas 3. Nut 2.2-2.8 x 1.2-1.5 mm, obovoid, trigonous; style base 0.1-0.3 mm long and thickened; stipe 0.1-0.3 mm long, greenish-brown, reticulate (Fig. 1).

Specimen seen: West Azerbaijan, Khoy, Qotur, Balalan (Ghani Ziarat), 2975 m, 05.07.2010, Amini Rad & Torabi (53983-IRAN); Khoy, Pasak, Avrin Mountain, 3060-3636 m, Amini Rad & Torabi (60853-IRAN). Mazandaran: Savadkouh, Alasht, Asbe Khoni village, 3063 m, 23.6.2010, Gholipour 672.

Habitat: Dry and stony mountain slopes, 2900-3400 m.

Geographical distribution: Europe, Caucasus (Armenia), Russia (Far East, Siberia), Mongolia, China and Iran.

According to Egorova (1999), this taxon is a montane-steppe widespread in S. of Siberia and Mongolia and it is rare in the Caucasus and Far East. The identification of *Carex pediformis* subsp. *Pediformis* in our collections confirms the presence of this species in Iran (Fig. 2).

Carex pediformis is rather polymorphic, varying mainly in habit, extent of tuft density, length ratio of leaf to stem, position of male spike to female spike, blade of lowest bract, shape of apex of the female glumes, number of veins on the utricles (Egorova 1999). Although the species has many variable characters, but these characters are continuous and are very difficult to be correlated with distinct species and for this reason, many synonyms exist (Egorova 1999, Dai et al. 2010).

In the specimen Gholipour 672, female glumes were strigose on lower surface and this character was not seen in other specimens. Despite to the high diversity of this species in different floras which are mainly of the female glumes surfaces characters, there are little infra specific taxa described. The taxonomic status of this specimen (Gholipour 672) cannot be defined with the present data and more detail work is needed.

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Fig. 1. *Carex pediformis* subsp. *pediformis*. A. habit; B. glume; C. utricle; D. nut

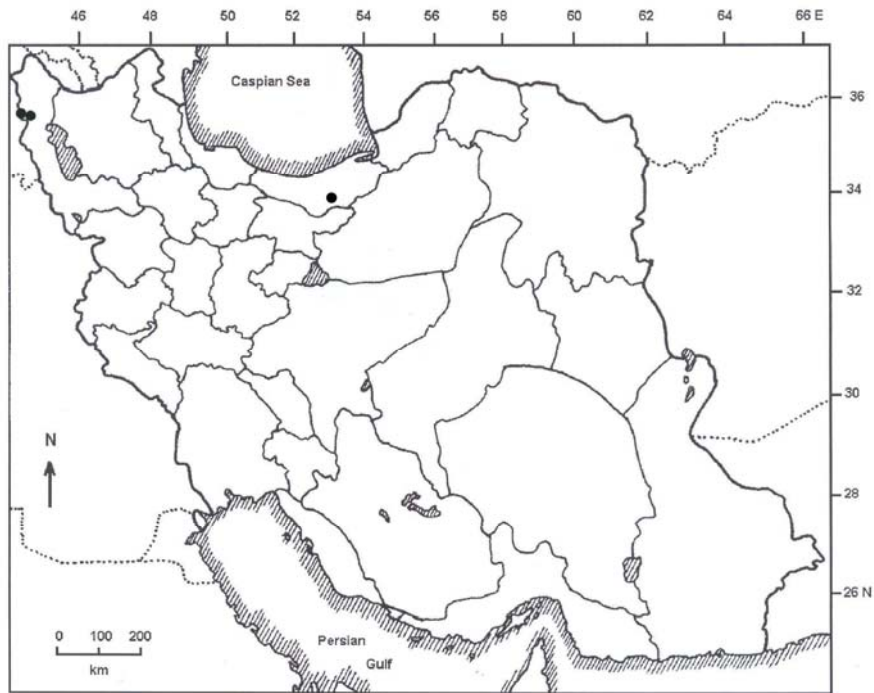


Fig. 2. Distribution map of *Carex pediformis* subsp. *pediformis*