

***Fuirena pubescens* (Poir.) Kunth (Cyperaceae), a new addition to the native flora of Cyprus**

Georgios N. Hadjikyriakou

Abstract. – *Fuirena pubescens* is recorded from Cyprus for the first time. A morphological description and information on its distribution and habitat are provided. It should be classified as 'Critically Endangered'.

Address. – Georgios N. Hadjikyriakou, Antifonitis str. 10, CY-4651 Trachoni Lemesou, Cyprus; alakati@cytanet.com.cy

Introduction

The genus *Fuirena* Rottb. comprises about 30 species, distributed in the warm-temperate to tropical and subtropical regions of both hemispheres (Kukkonen & Simpson 2005, Muasya 2010). However, *F. pubescens*, (subgenus *Pentasticha*; Muasya 1997: 187–202) occurs in the Iberian Peninsula, many Mediterranean countries, eastwards to Pakistan and India and in tropical and southern Africa. The countries close to Cyprus in which *F. pubescens* is present are: Greece (Crete, Rhodos), Turkey, Israel, Lebanon and Egypt. Studies of the author in Cyprus revealed two small groups of plants that belong to the genus *Fuirena*, which is recorded for the first time in Cyprus. The specimens collected have been compared with descriptions and illustrations in literature, particularly those referring to the Mediterranean countries: De Filippis (1980), Feinbrun-Dothan (1986), Kukkonen & Simpson (2005), Muasya (2010, 1997), Muasya & Baquar (1995), Pignatti (2002), Post (1933), Täckholm (1974), Tan & Oteng-Yeboah (1985), Turland & al. (1995). Also, they have been compared with specimens of *F. pubescens* from Crete. Furthermore, Ralf Hand (B) made additional comparisons with specimens deposited in the Botanical Museum, and, at the same time, he promoted the cultivation of a small rhizome part in the Berlin Botanical Garden, which is now well growing. Additional cultivation has been promoted by the author, using plants transferred from the Berlin Botanical Garden. And finally, Filip Verloove (BR) made further comparisons with material kept at Meise and shared his experiences with the species in Portugal.

The overall examinations carried out so far show that the Cypriot population of *F. pubescens* has some characteristics not mentioned in the literature such as the extremely long, sprawling or scrambling culms and the greenish colouration of the nutlets. Most of these characteristics, neglected so far in the literature, could be found in some Mediterranean and Afrotropical specimens of the widespread species. They can be classified as taxonomically weak regarding the genus *Fuirena* or many *Cyperaceae* in general (comm. F. Verloove). However, it was found more appropriate to publish a detailed description strictly based on the Cypriot material in order to document the

variability of the species. Characteristics and measurements were obtained from the field, the cited specimens and cultivated plants (see below).

Description based on Cypriot material

Perennial plant. **Rhizome** horizontal. **Culms** lined along the rhizome at (3–)10–15 mm intervals, slender, suberect at the very early stage, soon sprawling or scrambling, (60–)100–230 cm long, 2–4 mm in diameter, trigonous, usually branching in the upper third, with branches up to 65 cm long; nodes glabrous; **internodes** of the main culms 8–16, including the lowermost ones with bladeless sheaths, the lowest short, glabrous or indistinctly papillose, occasionally only towards the angles. **Leaves** 8–16; **sheaths** tubular, the lowermost 25–45 mm long, from which the bladeless shortly hairy, whereas those with short blades 5–15(–25) mm long, glabrous; the upper up to 80 mm long, all loosely fitting, glabrous, occasionally the uppermost hairy; mouth oblique, brown, glabrous or hairy; ligule (1.0–)1.5–2.5 mm long, scarious, whitish at first, light brown with age, shortly ciliate. **Blades** of the upper leaves spreading, (4–)10–30 cm × 4–9 mm, sometimes shorter than the distance between the mouths of the two leaves, but, particularly those found in the middle of the culms, usually longer to much longer, keeled, flat, green, usually puberulent only along the mid-vein of the upper surface and the upper third, commonly glabrous or papillose elsewhere; margins narrowly recurved; apex trigonous, acuminate, brown, puberulent, ciliate on the angles. **Inflorescence** composed of 1–2 partial inflorescences arising from the axil of the topmost leaf; primary peduncles 2.5–18.5 cm long, glabrous or papillose in the lower part, puberulent to densely pubescent and papillose or epapillose above; partial inflorescence paniculate or a compact or a lax cluster of spikelets; secondary peduncles, when present, 3–20 mm long, densely pubescent, with tubular bracteole. **Bracts** usually equal or longer than spikelets, pubescent, apex trigonous. **Spikelets** 4–6, sessile or subsessile, 5.0–8.0 × 2.5–4.5 mm, terete, ovoid, with 30–40 glumes, bracteole binerved 2.5–2.8 × 2.0 mm, greenish-white in general appearance, puberulent externally, glabrous internally, ciliate at the margins. **Glumes** 2.5–3.5 mm long, ovate to broadly oblong-elliptical, cymbiform, rounded or shortly auriculate at apex, puberulent externally, glabrous internally, green and 3-nerved along the middle, margins broadly membranous, white; **arista** 1.5–4.0 mm long, puberulent. **Perianth** bristles absent or present; when present 6, all similar, with recurved barbs, in two whorls, the 3 inner longer than the nutlet, 2–3 mm long, the 3 outer shorter than the nutlet, c. 1(–2) mm long. **Stamens** 3, filaments up to 5 mm long, anthers brown, linear, 1.0–2.8 × 0.3–0.5 mm. **Styles** 3.5–5.0 mm long, including stigma branches; **stigma** branches 3, hispidulous, up to 3 mm long. **Nutlets** (see also fig. 1) 1.6–2.0 × 0.8–1.2 mm, obovoid, trigonous, truncate on top, cuneate-acuminate or beaked towards the base, edges rather sharp, white, whitish-green or white with green tinge at the angles, surface slightly convex, smooth or somewhat reticulate, shining; persistent style base usually narrowly trigonous, 0.30–0.50 × 0.10–0.15 mm, with the base usually distinctly narrower than the truncate top of the nutlet, sometimes style base broadly trigonous, however its edges do not merge with the edges of the always truncate-topped nutlet.

Flowering period: (May–) August–November.



Fig. 1: *Fuirena pubescens*, Cyprus, Amargeti, nutlet with truncate apex and perianth bristles with recurved barbs (specimen *Hadjikyriakou 7040*), 16.11.2008. – Christodoulos Makris.

Distribution, habitat and ecology

F. pubescens is located in the administrative boundaries of Amargeti village (phyto-geographical division 3, sensu Meikle 1977), Pafos district, in the moist streambed of Argaki (stream) tou Agiou Georgiou, southeast of the village, at c. 220 m altitude. An area of about 5 km² was investigated in this stream, as well as other moist streambeds in the vicinity. However, the investigation showed that its population is restricted in two very small groups along the aforementioned streambed, in an area of 1000 m².

The geological substrate belongs to Lefkara Formation – chalks, marls, marly chalks, chalky marls with cherts in places as bands or nodules (Constantinou & al. 1997). The habitat types (Directive 92/43 EEC) recognised are: 92D0 southern riparian galleries and thickets (Nerio-Tamaricetea) and 9540 Mediterranean pine forests with endemic Mesogean pines (*Pinus brutia*). The predominant plants are: *Pinus brutia*, *Nerium oleander*, *Myrtus communis*, *Pistacia terebinthus*, *P. lentiscus*, *Rubus sanctus*, *Smilax aspera*, *Lythrum junceum*, *Scirpoides holoschoenus* subsp. *australis*, *Equisetum ramosissimum*, *Samolus valerandi*, *Arundo donax*, *Typha domingensis* and various species of the genera *Juncus* and *Carex*.

It is a hygrophilous plant growing along the moist margins of the stream, whereas in the stream itself usually there is either running or stagnant water (see fig. 2). Apparently it does not survive droughts.



Fig. 2: *Fuirena pubescens*, Cyprus, Amargeti, typical habitat, 23.11.2009. – Georgios N. Hadjikyriakou.

IUCN status, threats and conservation

From the investigation carried out so far, *F. pubescens* seems to be one of the rarest plants in Cyprus. According to the IUCN Red List categories and criteria (version 3.1; IUCN Species Survival Commission 2012), it is categorized as CR (Critically Endangered): D – this means that the population size numbers fewer than 50 mature individuals + E – this means that quantitative analysis shows that the probability of extinction in the wild is at least 50 % within ten years. It should be noted that it has been discovered in 2008 and the number of mature individuals was about 100; however, in five and a half years (16.11.2008–16.5.2014) this number was reduced to less than 50 mature individuals and in ten years (22.9.2018) this number was reduced to two individuals, growing along by the side of the nature trail. The main threats are: uprooting by stream overflowing, nature trail construction and maintenance, tourism, particularly the users of the nature trail, droughts, road construction, forest fires and forestry operations (thinnings etc.). All the above suggest urgent in situ and ex situ conservation measures. Cultivation at the Berlin Botanical Garden revealed that the species can easily be propagated by rhizomes. It also produces viable nutlets which show a relatively high germination rate.

Specimens seen

Cyprus: Div. 3 (sensu Meikle 1977): Argaki Agiou Georgiou SE of Amargeti, moist stream bed, c. 220 m, 16.11.2008, G. Hadjikyriakou 7040 (herb. Hadjikyriakou, B).

Cultivated plants from this site: at Trachoni Lemesou, 9.9.2014, *G. Hadjikyriakou* 7335 (herb. Hadjikyriakou). – at Bot. Garden Berlin-Dahlem, acc. number 237-10-10-20, 20.7.2011, *M. Cubr* 47724 (B-garden herb.); *ibid.*, 18.10.2011, *R. Hand* in *G. Hadjikyriakou* 7452 (herb. Hadjikyriakou); *ibid.*, 5.6.2012, *R. Hand* in *G. Hadjikyriakou* 7453 (herb. Hadjikyriakou); *ibid.*, 15.8.2012, *R. Hand* (B); *ibid.*, 6.6.2013, *R. Hand* in *G. Hadjikyriakou* 7454 (herb. Hadjikyriakou); *ibid.*, 14.5.2014, *R. Hand* (B); *ibid.*, 5.2017, *R. Hand* (B, BR).

Selected specimens from other Mediterranean regions

Portugal: Coïmbra, bei Santo Antonio dos Olivaes, Carregal, auf Sandboden, 58 m, 7.1903/6.1905, *M. Ferreira*, *Kneucker Exs. Cyper. VI/151* (B). – Mil-Fontes, 1905, *G. Sampaio* (B).

Spain: Sierra de Palma, prope Algeciras, 17.7.1887, *E. Reverchon* (B). – Caceres, Cuacos de Yuste, Cuaternos-Fuente – del Señorito, 30T TK7634, 250 m, cunetas húmedas y ribazos encharcados ..., 26.8.1980, *E. Rico* (B).

France: Corsica, Ajaccio, a. d. Küste, 1.7.1937, *Rauh* (B). – Corse, Ajaccio, dans les gazons mouillés du bord de la mer, au delá de la Chapelle des Grecs, 29.5.1901, *H. Coste*, *Soc. Fl. Franco-Helvetique* 1242 (B). – Corse, Commune de Peri, depuis la route N 193, en direction de Peri, après le passage à niveau, bord de la route N 229 et le long de la voie ferrée, 110 m, fossés humides même pendant l'été, 18.10.1996, *G. Dutartre*, *Soc. Éch. Pl. Vasc. Eur. Bass. Médit.* 13897 (B).

Italy: Liguria occid., In paludibus collium inter Voltri et Arenzano, 7.1888, *F. Baglietto*, *F. Schultz*, *Herb. Norm. Nov. Ser. Cent.* 25/2496 (B).

Greece: Naxos, Engares, 150 m, 37°06'42"N 25°27'59"E, 17.5.1992, *N. Böhling* 1544 (B). – *ibid.*, 140 m, 37°06'30"N 25°27'42"E, 4.5.1995, *N. Böhling* 4290 (B). – Crete, Fassis valley Chania, moist soil, c. 300 m, 29.7.1999, *Fournaraki & Wolf* 5157 (MAIC).

Israel: Jaffa, Wadi Rubin, south of Tel-Aviv, 3.4.1926, *R. Gross* (B).

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References

- Constantinou G., Panagidis I., Xenofontos K., Afrodisis S., Michailidis P. & Krambis, S. 1997: The Geology of Cyprus. – Geol. Surv. Dep. Bull. 10 (in Greek).
- De Filippis R. A. 1980. *Fuirena*. P. 284. – In: Tutin T. G., Heywood V. H., Burges N. A., Moore D. M., Valentine D. H., Walters S. M. & Webb D. A. (ed.), *Flora Europaea* 5. – Cambridge & al.

Hadjikyriakou G. N.: *Fuirena pubescens* (Poir.) Kunth (*Cyperaceae*), a new addition to the native flora of Cyprus

Feinbrun-Dothan N. 1986: *Flora Palaestina* 4. – Jerusalem.

IUCN Species Survival Commission 2012: IUCN Red List categories and criteria, Version 3.1, ed. 2. – Gland.

Kukkonen I. K. & Simpson D. 2005: *Fuirena*. Pp. 369–371. – In: Boulos L. (ed.), *Flora of Egypt* 4. – Cairo.

Meikle R. D. 1977: *Flora of Cyprus* 1. – Kew.

Muasya A. M. 1997: A synopsis of *Fuirena* (*Cyperaceae*) for the Flora of Tropical East Africa. – *Kew Bull.* 53: 187–202.

Muasya M. 2010: *Fuirena*. Pp. 8–21. – In: Beentje H. J. 2010 (ed.), *Flora of Tropical East Africa, Cyperaceae*. – Kew.

Muasya A. M. & Baquar S. R. 1995: Taxonomic studies in the *Fuirena pubescens* complex (*Cyperaceae*) in Kenya. – *Nordic J. Bot.* 15: 407–410.

Pignatti S. 2002: *Flora d'Italia* 3. – Bologna.

Post G. E. 1933: *Flora of Syria, Palestine and Sinai* 2. – Beirut.

Täckholm V. 1974: *Student's flora of Egypt*. – Cairo.

Tan K. & Oteng-Yeboah A. 1985: *Fuirena*. Pp. 66–67. In: Davis P. H. (ed.), *Flora of Turkey and the East Aegean Islands* 9. – Edinburgh.

Turland N. J., Chilton L. & Press J. R. 1995: *Flora of the Cretan area*. – London.