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Contribution to the flora of Cyprus: a new species of *Crypsis (Poaceae)*

Abstract

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Crypsis hadjikyriakou is described as a new species from the Troodos range of Cyprus and illustrated. Its relationship with other species of the genus is discussed and ecological data about its habitat are given.

Introduction

It was a tiny annual grass in peaty grasslands of the Troodos range of Cyprus that, in 1999, attracted the attention of G. Hadjikyriakou who sent specimens of it to Berlin for determination. A study of the plants revealed that they represent a taxon that already 20 years ago was considered by Bor, in the second volume of Meikle's Flora of Cyprus (Meikle 1985), to possibly represent a new species. A closer investigation of the case resulted in the present paper.

Crypsis hadjikyriakou Raus & H. Scholz, **sp. nova**
Holotype: Cyprus, central Troodos area, Almyrolivadon, margin of marshy place, 1600 m, 23.7.1999, *Hadjikyriakou 4721* (B; isotypes: B, BTU, herb. Hadjikyriakou).

Gramen annuum. *Culmi* singuli sive pauci interdum ramosi, erecti vel prostrati, 1-4 cm alti. *Folia* glauca laminis a vaginis distincte discretis, 5-15(-20) mm longis et 0.5-1 mm latis, lanceolato-acuminatis, planis vel involutis, margine scabris, in superficiebus ambabus conspicue nervatis interdum inter nervis scabris pilis longis basi tuberculatis sparse pilosis. *Vaginae* omnes inflorescentiam involucrantes plerumque internodiis conspicue longiores, inflatae, dorso rotundatae nervis distinctis glabris et marginibus membranaceis plerumque ciliatis, extus inter nervis pilis longis basi tuberculatis sparse pilosae, superiores regulatim laminis deminutis, supremae saepe bracteoideae. *Ligula* e seria pilorum constans. *Inflorescentia* 5-10 mm longa et 4-5 mm lata rachidi glabrae, paniculam spiciformam, anguste ovoideam vel ellipsoideam spiculis fertilibus 8-15 sterilibusque 1-2 formans. *Spiculae* cuneatae, compressae, 3-4 mm longae, inferiores binatae una sessili altera breviter pedicellata, superiores breviter pedicellatae solitariae. *Glumae* subaequales, 2-2.5 × 0.5-1 mm, uninerviae, praeter carinam scabram glabrae, ovatae, lanceolatae vel

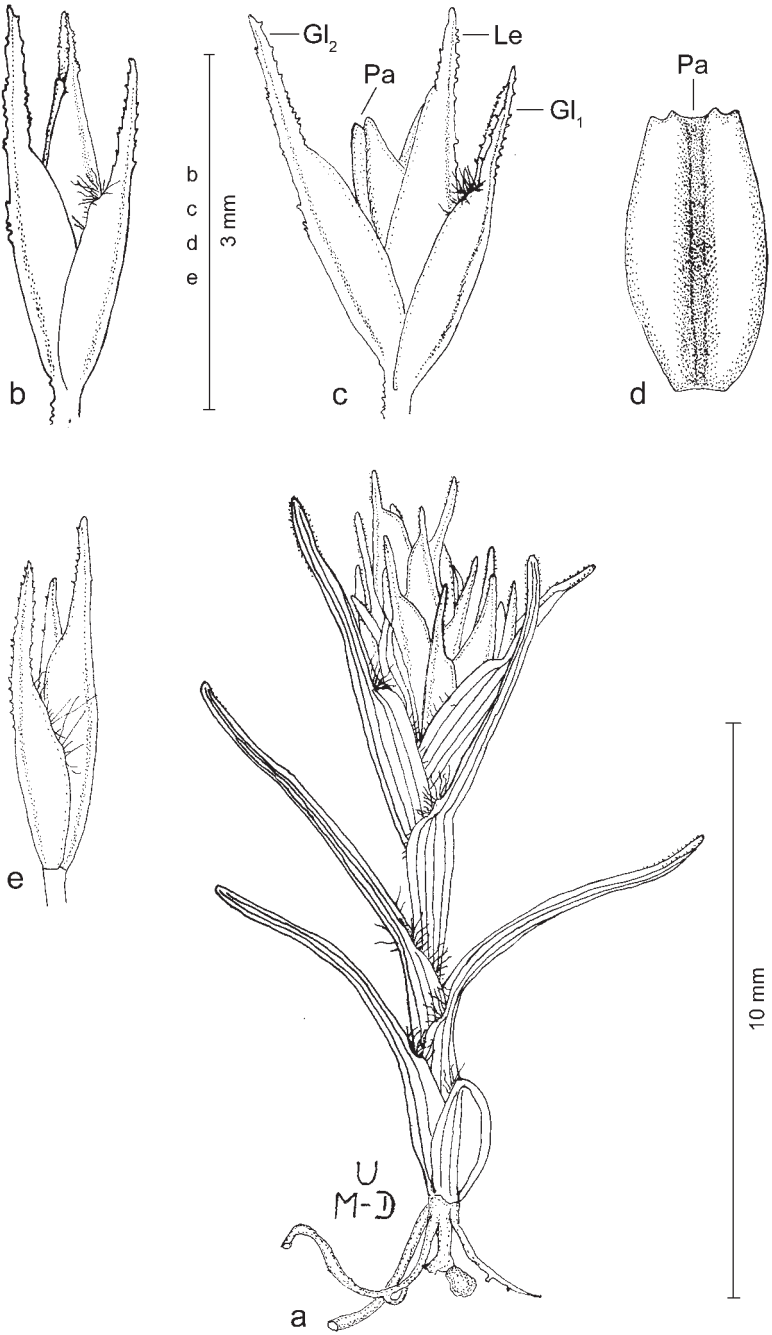

Fig. 1. *Crypsis hadjikyriakou* – a: habit; b: terminal spikelet in naturally dried stage; c: terminal spikelet expanded to make the palea visible; d: palea with overall truncate apex displaying in addition four tiny lobes; e: lateral spikelet (third spikelet below the terminal one) to show that it is only slightly smaller than the terminal one. – Gl_1, Gl_2 = lower and upper glume, Le = lemma, Pa = palea; drawings by U. Müller-Doblies after the holotype at B.

obovatae, membranaceae, in acumen cuspidatum 0.8-1.2 mm longum angustatae, gluma inferior supra margine ciliata, gluma superior inferiori latior et nonnihil longior margine glabra. *Lemma* 2-2.5 × 0.8 mm, uninervium, membranaceum, in acumen cuspidatum 0.5-0.8 mm longum angustatum. *Palea* 1.2-2 × 0.5-1.2 mm, binervia, membranacea, truncata, 4-lobata, secus nervos plicata. *Ovarium* 0.5-0.7 mm longum, obovatum. *Styli* 2, filiformes, c. 2 mm longi. *Stamina* 3, c. 2.5 mm longa filamentis filiformis antheribusque 0.6-0.8 × 0.2-0.3 mm luteis vel purpureo-fuscis. *Caryopsis* 1.5-2 × 0.7 mm embryone quarta parte longior, oblonga vel oblongo-elliptica, leviter compressa, atrofusca.

Annual grass. *Culms* simple or few from the base, sometimes branched, erect or prostrate, 1-4 cm long. *Leaves* glaucous-green. *Leaf blades* distinctly demarcated from the sheath, lanceolate-acuminate, flat or involute, 5-15(-20) × 0.5-1 mm, conspicuously ribbed on both surfaces, scabrid on the ribs of the upper surface and the margins, sparsely pilose above and below with long tubercle-based hairs between the nerves. *Sheaths* rounded on the back, markedly ribbed on the outer surface, not scabrid on the nerves, sometimes sparsely pilose with tubercle-based hairs between the nerves, with membranous, usually ciliate margins, inflated, usually conspicuously longer than the internodes, the upper 2-3 usually with reduced blades, the uppermost usually bract-like, all of them supporting the inflorescence as an involucre. *Ligule* a fringe of hairs. *Inflorescence* a narrowly ovoid or ellipsoid spiciform panicle usually of 8-15 fertile and 1-2 sterile spikelets, 5-10 × 4-5 mm. *Rachis* glabrous. *Spikelets* 3-4 mm long including acumens, wedge-shaped, compressed, the lower in pairs with one sessile and the other one short-pedicellate, the upper solitary, short-pedicellate. *Glumes* subequal, 2-2.5 × 0.5-1 mm, 1-nerved, glabrous, scabrid on the keel, ovate, lanceolate or obovate, membranous, narrowing into a cuspidate acumen, the acumen 0.8-1.2 mm, the lower glume ciliate in the upper part either on both margins or at least on one margin, the upper glume broader than the lower and somewhat longer, not ciliate on the margin. *Lemma* 2-2.5 × 0.8 mm, membranous, 1-nerved, narrowing into a cuspidate acumen, the acumen 0.5-0.8 mm. *Palea* membranous, truncate, 4-lobed, 1.2-2 × 0.5-1.2 mm, 2-nerved, plicate along the nerves. *Ovary* 0.5-0.7 mm long, obovate. *Styles* 2, filiform, about 2 mm long. *Stamens* 3, filaments filiform, about 2.5 mm long. *Anthers* 0.6-0.8 × 0.2-0.3 mm, yellow or purplish brown. *Caryopsis* dark brown, oblong or oblong-elliptic, slightly compressed, 1.5-2 × 0.7 mm. *Embryo* about ¾ the length of the grain.

Etymology. – The new species is dedicated to its re-discoverer and one of Cyprus's most excellent contemporary floristic investigators, Georgios N. Hadjikyriakou, whose name, in the Greek language, represents the genetive case. This vernacular genetive is here apposed to the generic name as an indeclinable epithet.

Additional specimens. – CYPRUS: Central Troodos area, Almyrolivadon, margin of marshy place, 1600 m, 28.8.1999, *Hadjikyriakou 4877* (B, herb. Hadjikyriakou); Pano Amiantos, Almyrolivado, near giant juniper at the road to Troodos, c. 1.5 km W of P. Amiantos, c. 1600 m, 20.10.2003, *Hand 3989 & Hadjikyriakou* (B); Livadhi tou Pasha, annual on dried peaty mud at the bottom of a dried pool, the snow lies six months here, 5.000', 18.7.1952, *Merton 902* (K [n.v.], under "*Crypsis ambigua* Bal.", fide T. A. Cope).

Taxonomic relationship. – The genus *Crypsis* is known to be represented in Cyprus so far by four species, namely *C. alopecuroides (*Pill. & Mitterp.) Schrad., *C. aculeata* (L.) Aiton, *C. factorovskyi* Eig and *C. schoenoides* (L.) Lam. (Bor 1985). Kit Tan also records *C. acuminata* Trin. subsp. *ambigua* (Boiss.) Kit Tan (*C. ambigua* (Boiss.) Lorch, see Lorch 1962), as part of the Cypriot flora (Tan 1985: 584). The origin of this record has not been traced and there is no evidence of the presence or absence of this subspecies in Cyprus.

In the habitat of Livadhi tou Pasha, Merton collected in 1954 *Crypsis alopecuroides* (*Merton 1950*! in the herbarium of the Agricultural Research Institute Nicosia). In the same habitat Merton collected also another specimen, which, according to Bor, is "a depauperate plant only 2 cm

Table 1. Diagnostic characters of *Crypsis hadjikyriakou*, *C. acuminata* subsp. *ambigua*, *C. schoenoides* and *C. alopecuroides*.

	C. hadjikyriakou	*C. acuminata* subsp. *ambigua*	*C. schoenoides*	*C. alopecuroides*
Culms	1-4 cm long, simple or very few from the base, sometimes branched, erect or prostrate	1-6 cm long, procumbent to geniculately ascending from base, unbranched	2-70 cm long, many, procumbent or geniculately ascending, more or less branched	up to 30 cm long, numerous, often widely spreading, a few cm tall in Cyprus plants
Leaf blades	0.5-1.2 mm broad, scabrid on the ribs of the upper surface and on the margins, sparsely pilose above and below with long tubercle-based hairs between the nerves	1-3 mm broad, puberulent to long-pilose on both surfaces	2-7 mm broad, villose or sparsely pilose	1-3 mm broad, scabrid on the ribs of the upper surface and on the margins, sparsely pilose above and below with long tubercle-based hairs between the nerves
Sheaths	conspicuously longer than the internodes, inflated, rounded and markedly ribbed on the back, not scabrid on the nerves, sometimes sparsely pilose with tubercle-based hairs between the nerves, margins membranous, usually ciliate	conspicuously shorter than the internodes, glabrous or pilose with tubercle-based hairs, margins narrowly membranous, sometimes fringed with hairs	usually shorter than the internodes, the uppermost usually inflated, margins broadly membranous, glabrous	rather loose, the uppermost longer than the lamina, scarcely inflated, glabrous or pilose, margins ciliate
Inflorescence	narrowly ovate or elliptic, panicle 5-10 × 4-5 mm, enveloped in its lower half by 2 or 3 leaves	dense, broadly to narrowly ovate, panicle 10-17 × 7-8 mm, remote from uppermost leaf or partly enveloped by its sheath at the beginning of flowering	oblong-elliptic to ovoid, panicle 10-40 × 4-12 mm, enveloped in its lower half by an involucre of 1 or 2 distal leaves	narrow, cylindrical to narrowly elllipsoid or oblanceolate, panicle 10-80 × 3-8 mm, often surrounded at base by the uppermost leaf sheath
Spikelets	3-4 mm, wedge-shaped, 10-13 at each panicle, 1-2 sterile at base	4-5 mm, sometimes sterile ones at base of the panicle	3-4 mm	2.5-3 mm, sterile spikelets absent
Glumes	subequal, ovate, lanceolate or obovate, narrowing into a cuspidate acumen, 2.5-4 mm including acumens which are ¼ -? × glumes, slightly scabrid on the keel, the lower glume ciliate on the upper part either on both or at least on one of the margins, the upper glume not ciliate on the margins	lanceolate, acuminate, slightly hairy along keel and margins, lower glume 3-4.3 mm long including awn which is $^1/_3$-$^2/_3$ × glume, upper oblong-lanceolate, abruptly ending in an awn $^1/_6$-$^1/_2$ × glume	lanceolate, acute, ciliate on keels, glabrous on margins, without acumen, lower glume 2.2-3 mm, upper 2.6-3.3 mm	unequal, lanceolate, not mucronate or awned, ciliate-serrulate on the keels, the lower 2 mm, the upper 2.5 mm

Table 1 continued from preceding page.

Lemma	2.5-3 mm, glabrous, ending into a cuspidate acumen of 0.5-0.8 mm, not or slightly exceeding glumes	2.5-5 mm, ciliate, obtuse, abruptly ending into an awn of 0.5-1.2 mm, not exceeding glumes	3-3.6 mm, unawned, acute, exceeding glumes	2-2.5 mm, oblong acute, slightly exceeding the glumes, scabrid on the keel
Palea	truncate to 2-4-lobed, 1.2-2.5 × 0.5-1.3 mm	obtuse, 2-veined, 2.5-3 mm	obtuse, emarginate or praemorse, $^2/_3$ the length of the lemma	obtuse or emaginate, c. 1.5 × 1 mm
Anthers	0.6-0.8 × 0.2-0.3 mm, yellow or purplish brown	1-1.5 mm	(0.5-)0.7-1.1 mm	(0.8-)1.5-2 mm, yellow or purple
Caryopsis	dark brown, oblong or oblong-ellipsoid, slightly compressed, 1.5-2 × 0.7 mm	ovoid, 1-1.5 mm, dark brown	oblong-ellipsoid, 1-1.2 mm	ellipsoid, 1-2 mm
Embryo	about $^3/_4$ the length of the grain	—	—	—

high and looks like *C. schoenoides,* but may be a new species" (Bor 1985: 1849 as "*Merton 502"*). The specimen is not found in the herbarium of the Agricultural Research Institute, Nicosia, where part of the collection of Merton is deposited, and Bor does not give any information about the place where the specimen is deposited. In June 1999 G. Hadjikyriakou collected an unknown *Crypsis (Hadjikyriakou 4721)* in the habitat of Almyrolivadon about 300 m apart from Livadhi tou Pasha, which is a small plant 1-4 cm high. The comparison of this *Crypsis* with Merton's specimen, to judge whether the two are identical, was impossible (see above) but the distinctions between Merton's specimen of *C. alopecuroides* and *C. hadjikyriakou* are very obvious (see Table 1). Moreover, *C. schoenoides* is a lowland plant, while *C. hadjikyriakou* is a plant of high altitudes. Only after completion of the present paper the missing Merton collection turned up to have been deposited at K, actually numbered *902* by the collector (T. A. Cope, in litt.).

The closest relatives of *Crypsis hadjikyriakou* are the genuine Mediterranean-Asiatic *C. schoenoides* (L.) Lam. and, in particular, the non-Cypriot *C. vaginiflora* (Forssk.) Opiz (*C. nilotica* Fig. & De Not.) described from Egypt and more restricted in distribution. The latter, previously in general considered synonymous with *C. schoenoides*, is now accepted as a separate species (Cope & Hosni 1991, Cope 1999 following Hammel & Reeder 1979). From both these, and all other c. 10 species of the genus *Crypsis* (Tzvelev 1989), *C. hadjikyriakou* differs in its dwarf habit, the single or very few culms and, most remarkably, the very pronounced acumen of the glumes (up to 1.2 mm) and lemmas (0.8 mm). *C. factorovskyi* Eig is easily discerned by the terminal heads being wider than long, sometimes compound through aggregation of subsidiary groups of spikelets, and by anthers 2-3 mm in length (Lorch 1962, Tan 1985).

Geographical distribution and ecology. – In the Troodos range of Cyprus there are two neighbouring, similar habitats of peaty grasslands, which are inundated by brakish water, known as Almyrolivadon and Livadhi tou Pasha. They are located at an altitude of 1650 m and the distance between them is about 300 m. Inundation fluctuates according to the season and the amount of annual rainfall and snowfall. During winter and spring there is an abundance of small pools, while during summer and autumn large parts of the habitats dry out. Each habitat covers an area of about 1.5 hectars. Geologically, the habitat and the surrounding area consist of pervasively serpentinized harsburgites with minor dunites and herzolites, of the Troodos ophiolite rocks. Both habitats (Almyrilivadon and Livadhi tou Pasha) are more or less flattish, surrounded by for-

est of *Pinus nigra* subsp. *pallasiana* (Lamb.) Holmboe and *Juniperus foetidissima* Willd. Repeated and close investigation of the area (Hadjikyriakou, in litt.) showed that the population of *Crypsis hadjikyriakou* is restricted today within a small plot of 1000 m square at the Almyrolivadon site. It occurs in small groups on the margins of dried-up peaty pools. The predominant accompanying species in the brackish habitat are *Agrostis stolonifera* L., *Calamagrostis epigejos* (L.) Roth, *Brachypodium sylvaticum* (Huds.) P. Beauv., *Juncus heldreichianus* Parl., *J. littoralis* C. A. Mey., *Scirpoides holoschoenus* (L.) Soják, *Schoenus nigricans* L., *Carex divisa* Huds. and others. It is stressed that this type of habitat is unique and extremely local on the whole of the Troodos mountain range. The new species flowers from July to August.

Crypsis hadjikyriakou is probably endemic to Cyprus.

Concluding remarks

A future task is the determination of the chromosome numbers of *Crypsis hadjikyriakou*. Such counts may be helpful in judging its genetic affinities to the two close relatives mentioned, perhaps also to *C. turkestanica* Eig from SE Russia, the Caucasus region and Central Asia (*C. schoenoides* $2n = 32, 36$; *C. vaginiflora* $2n = 54$; *C. turkestanica* $2n = ?$, according to Hammel & Reeder 1979, Tzvelev 1976). Unfortunately, the many attemps in a course of a one year timespan (2003/2004) to stimulate germination of seeds taken from the herbarium material and of additional seed material collected in 2003 from the type locality and committed by R. Hand (Berlin) failed totally, whether tried on natural and artificial substrates in the conservatories of the Botanic Garden Berlin-Dahlem or in the laboratorium of the Botanical Museum under various and combined conditions (cold stratification, low and high water supply, surplus illumination, etc.). Probably the seeds need more than five years to overcome the innate or induced dormancy.

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