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Cicer uludereensis Dönmez: a new species of *Cicer* (Chickpea) (Fabaceae) from around the Fertile Crescent, SE Turkey

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Abstract: The genus *Cicer* L. includes an important crop plant, chickpea, which has been used as a protein source since prehistoric times. Specimens of a native *Cicer* have been collected and described from south-east Turkey. This new species, *Cicer uludereensis* Dönmez sp. nova, is distinct from a closely allied species, *Cicer isauricum* P.H.Davis, by its fine and more numerous teeth per leaflet, larger stipules, and narrower fruit with almost smooth seed surface. An illustration and a distribution map of the new species are provided and observations on the population are discussed.

Key words: Chickpea, *Cicer*, IUCN, systematics, taxonomy, the Fertile Crescent, Turkey

Cicer uludereensis Dönmez: Güneydoğu Türkiye, Bereketli Hilal çevresinden, yeni bir *Cicer* (nohut) (Fabaceae) türü

Özet: *Cicer* L. cinsi tarih öncesi zamanlardan beri protein kaynağı olarak kullanılan ve önemli bir baklagil olan nohutu da içermektedir. Güneydoğu Türkiye'den toplanan doğal *Cicer* örnekleri yeni tür olarak betimlenmiştir. Bu yeni tür, *Cicer uludereensis* Dönmez, yakın akrabası olan *Cicer isauricum* P.H.Davis'dan yaprakçıkların fazla ve ince dişli, geniş kulakçıklı, dar meyveli ve tohum yüzeyinin hemen hemen düz oluşu ile ayrılmaktadır. Yeni türün çizimi ve dağılım haritası verilmiş, populasyon yapısı tartışılmıştır.

Anahtar sözcükler: Bereketli Hilal, *Cicer*, IUCN, nohut, sistematik, taksonomi, Türkiye

Introduction

The genus *Cicer* L. is represented by 44 species worldwide (Linchevskii, 1948; Townsend, 1966; Mabberly, 2008) and 11 species are found in Turkey (Contandriopoulos et al., 1972; Davis, 1972; Ladizinsky, 1975). Monographic studies on *Cicer* have been carried out and the studies have provided important contributions to the taxonomy of the genus (Van der Maesen, 1972; Davies et al., 2007; Van der Maesen et al., 2007). Beside this, the floristic richness of Turkey is still surprising to taxonomists because the country still harbours some undiscovered taxa, including among the well-studied *Cicer* taxa.

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During field work in south-east Turkey, an unusual *Cicer* specimen was collected from Tanintanin Mountain near Uludere (Şırnak province) situated in the Fertile Crescent. The specimens are similar to *C. isauricum* P.H.Davis at first glance, but it was noticed that they have characteristic leaflets and longer fruits. Therefore, it was decided that these materials belong to an undescribed taxon. Examination of the herbarium materials of all the available Old World taxa, including type specimens from the W and G herbaria, reveals that the specimens have not been previously collected and published. Further studies based on the literature and herbarium materials support the idea that the specimens under study belong to a new taxon at species level, and it is closely allied to *C. isauricum* with several different characters.

A new field trip for collecting more material having mature fruits, observing the population and taking pictures at the same locality, took place 5 years later. All the collected materials and gathered data were used for describing the new species.

Cicer uludereensis Dönmez **sp. nova** (Figures 1-2)

Type: Turkey C9 Şırnak: Uludere, Dağdibi village, Kurudere district, 37°23′451″N 038°07′418″E, 1186 m, among *Quercus* scrub, 29.vi.2009, *A.A.Dönmez* 15478 (Holotype: HUB, isotypes: HUB, GAZI, KNYA, WAG). Paratype: C9 Şırnak: Uludere, 2 km from Dağdibi village to Şırnak-Hakkari road, limestone, *Quercus libani* opening, 37°22′320″N 043°07′784″E, 1124 m, 26.v.2004, *A.A.Dönmez* 11918 (HUB).

Diagnosis: Affinis *Cicer isauricum* P.H.Davis sed stipules magnis; foliolis multidentatis (c. 50) subtiliter; leguminibus angustis; seminibus laevigatis differt.

Erect perennial herb, much-branched from woody rootstock, 60-100 cm tall, stem terete with finely raised lines, covered with sparsely multicellular-eglandular, glandular, and shortly stipitate glandular hairs on stem, densely on the inflorescence. Leaves 9-

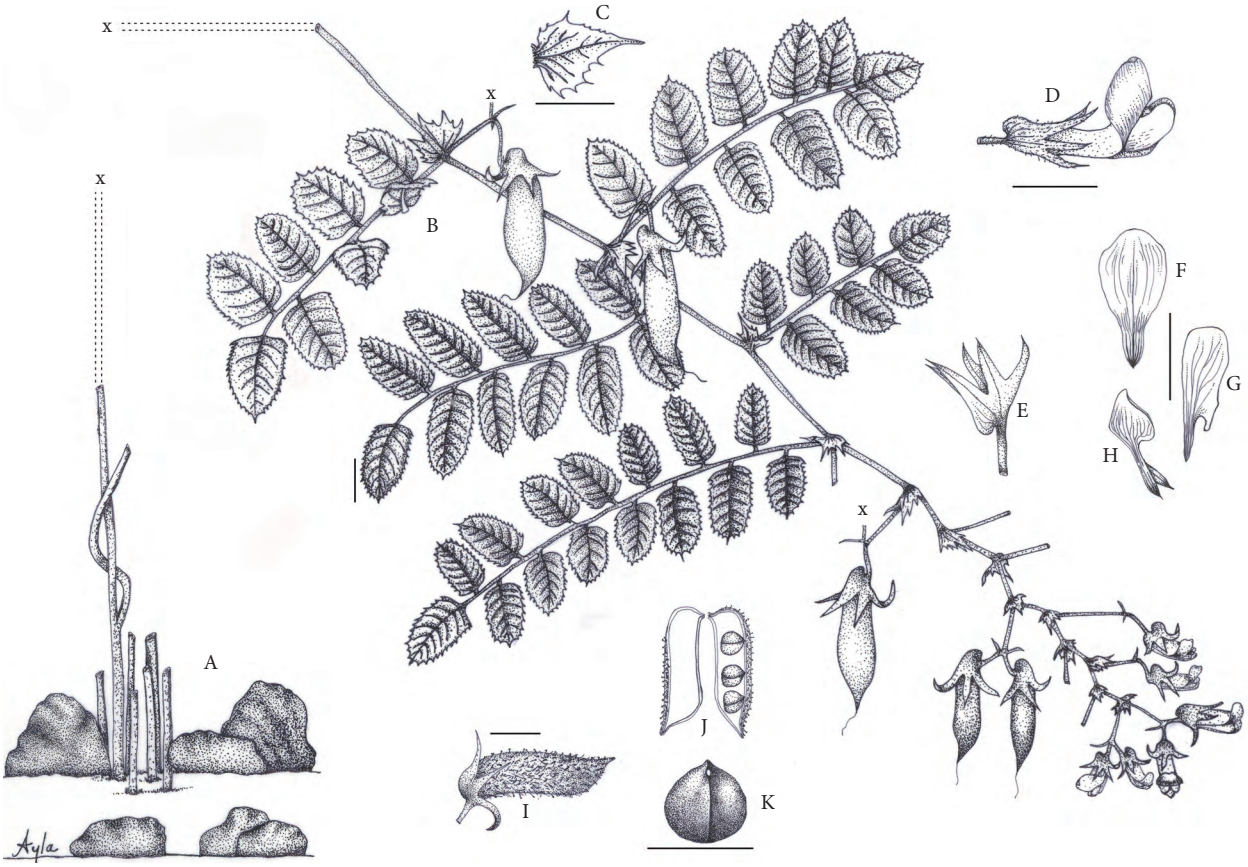

Figure 1. *Cicer uludereensis*. A-habitat, B-stem, C-stipule, D-flower, E-calyx, F-standard, G-wing, H-keel, I-fruit, J-opened legume, K-seeds (from *A.A.Dönmez* 15478). Scale bars: 1 cm; x: cut part.

Figure 2. Seeds of *C. uludereensis* (A; from *A.A.Dönmez* 15478) and *C. isauricum* (B; from *H.Peşmen* 2233).

14 × 4-6 cm in outline, coriaceous to semi-coriaceous, imparipinnate with (3-) 5-7 pairs of leaflets; lower petioles up to 5-9 mm, upper shorter; rachis terminate with a leaflet; leaflets 20-30 (-40) × 12-18 mm, generally subopposite, oblong to slightly obovate, glabrous below, sparsely pilose on nerves and margin above, truncate or shortly attenuate, entire at base, obtuse to truncate with a minute mucro at apex, finely dentate margin (c. 50 teeth per leaflet). Stipules 7-13 mm × 6-10 mm at middle leaves, in various sizes, widely triangular to deltoid, strongly nerved, irregularly dentate with 6-9 teeth. Inflorescence mostly terminal, simple or compound raceme with short and long glandular hairs. Flowers lilac-blue, sulphur-yellow in developing stage; 12-25 mm in length; mostly in pairs on peduncle, rarely solitary or 3-flowered; peduncle mostly terminating 3-6 mm linear awn. Bracts semiorbicular in outline with 7-11 teeth; (2-) 4-6 × (2-) 3-5 mm; stalked glandular hairs dense below and sparsely above, pedicels 4-7 mm, 8-10 mm in fruit, patent or slightly deflexed. Calyx 10-13 mm, dorsally gibbous, densely multicellular glandular; teeth lanceolate to narrowly triangular. Corolla mainly light lilac-blue, (12-) 16-22 mm; standard 14-18 × 8-11 mm, obovate, contracted into claw and lamina; apex of lamina widely obtuse; wings 13-16 mm, distinctly divided into lamina and claw, lamina oblong, concave below, with auricle, claw 3-4 mm, linear; keels 12-14 mm, distinctly divided into lamina and claw, lamina ovate, claw 5-6 mm, linear. Fruit oblong, 28-32 (-38) × 8-11 mm, densely covered with long multicellular glandular hairs. Seeds 4-6, globose, 7-8 × 6-7 mm, smooth to rugulosus.

Flowering in May-June. Limestone main rock, among *Quercus* scrub and vegetation clearings. 1100-1500 m.

Endemic. Irano-Turanian element. The species is known from 2 localities of Dağdibi village and other areas of Uludere (Figure 3).

The epithet mentions the collection area, the town Uludere (Şırnak).

Discussion

C. isauricum, C. montbretii Jaub & Spach, and *C. floribundum* Fenzl are closely allied taxa and they are assigned to the section *Polycicer* Popov (Davies et al., 2007). Original publications and type materials of these taxa were examined and some of the selected specimens are given in the Appendix. This new species is closely allied to *C. isauricum* and it is compared with that species (Table). In addition, all the available specimens of the Old World *Cicer* taxa present at G and W herbaria were examined.

The height of some individuals of the new species, especially that of the plants growing in the shadow of the *Quercus* scrub, reaches up to 1 m. Hence, *C. uludereensis* appears to be one of the tallest plants among the known species of the genus. On the other hand, the height of *C. isauricum* is given as 20-40 cm by Davis (1972) and van der Maesen (1972). Nevertheless, the length of the species exceeds 40 cm according to my observation during both field and herbarium work.

The fruit shape of the new species is oblong and the fruit is quite long like that of *Lathyrus* spp. This species has the longest fruits among the known species of the genus.

Flower colour in *C. uludereensis* is sulphur yellow during the developing stage and it becomes violet at maturity. Both of these colours can be seen in dried materials and herbarium specimens. Unfortunately, Davis (1972) does not give information about flower colour for *C. isauricum*, and this is mentioned by Maesen (1972) as white. According to my field observation and comparative studies in the herbarium materials of both species, they have the same colours in the developing stage and at maturity.

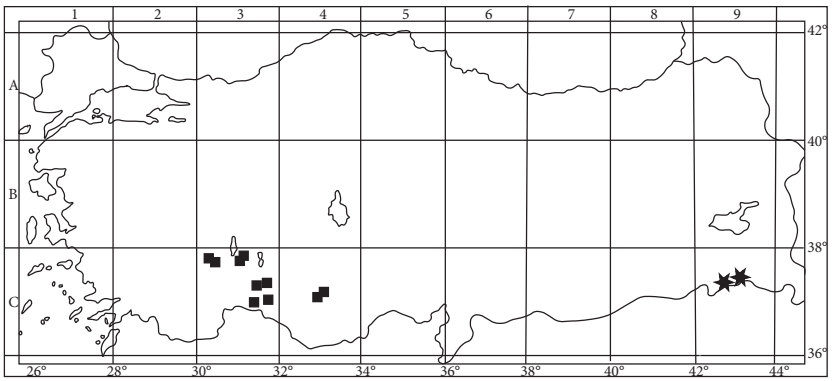

Figure 3. Distribution of *Cicer uludereensis* (✶) and *C. isauricum* (■).

Table. Morphological comparison of *Cicer uludereensis* with *C. isauricum*.

Characters	*Cicer uludereensis*	*Cicer isauricum*
Plant	60-100 cm	20-40 cm
Leaflet texture	coriaceous to semi-coriaceous	semi-coriaceous and leafy
Leaflet margin	finely dentate	coarsely dentate to serrate
Teeth per leaflet	45-50	20-25
Stipule length	7-13 mm	3-5 mm
Stipule teeth	6-9	1-3
Claw of standard	as long as lamina	absent or very short
Spur of wing	1/2 of stipe	shorter than 1/2 of stipe
Fruit shape	oblong	oblong to ellipsoid
Fruit size	22-30 mm	15-25 mm
Seed surface	smooth to slightly rugulose	verrucose

Leaf sizes of both species are variable. In addition, *C. isauricum* has more variable and smaller leaves than the new species. Leaf texture of *C. uludereensis* is semi- coriaceous, while *C. isauricum* has leafy and slightly coriaceous leaves.

Calyx teeth of *C. isauricum* are not only entire, but also sometimes have 2-3 teeth at the apex. This variation was observed in a specimen collected from Antalya (*H. Sümbül* 3270!; HUB). In addition, this form of calyx teeth is not common among the other specimens of the species. On the other hand, calyx teeth of all the examined specimens of *C. uludereensis* are the same shape.

C. isauricum has 2 types of leaves: one is oblong and the other has orbicular leaflets. These 2 groups of specimens are separated from each other at the variety level. However, this requires further studies in populations of the species.

The new species grows on limestone rock, in the *Quercus libani* Oliv. scrub as well as in the openings of other deciduous scrubs. Nevertheless, habitats of *C. isauricum* are variable, including limestone and igneous rocks, and various types of conifer forests and their openings, such as *Abies cilicica* (Antoine & Kotschy) Carr., *Pinus nigra* J.F.Arnold, and *Quercus* spp. forest.

Seed surface of *C. uludereensis* is nearly smooth to slightly rugulose with short and irregular lines. It is clearly different from that of *C. isauricum* with a verrucose structure characterised by distinct protuberances, called warts by Davis (1972) (Figure 2). The length of these protuberances is greater than their width. In respect of the surface morphology of these 2 species, they are definitely different from each other.

As is known, the Fertile Crescent is one of the centres of civilisation and it is the birthplace of writing

and the wheel. Many crop plants, including cereals and pulses, were firstly cultivated here and their wild relatives grow naturally in the region (Zeven & Zhukovsky, 1975). The 2 major rivers, Dicle (Tigris) and Fırat (Euphrates), have chiefly irrigated the region since prehistoric times and an important part of the Fertile Crescent is found in south-east Turkey, surrounded by these 2 rivers. One of the ultimate branches of the Dicle, called Habur, originates from the foothills of Tanintanin, where the type locality of the new species under study is situated. The habitats of the new species are found in the Fertile Crescent, which supports many crop plants.

Chickpea is an important crop plant cultivated in Turkey and it has been used traditionally for a long time (Zhukovsky, 1951). Although chickpea cultivation has decreased considerably in Turkey, its wild relatives are obviously native to Turkey. For example, *C. echinospermum* P.H.Davis and *C. reticulatum* Ladiz. are annual species and they are closely related to chickpea. In consideration of the distribution pattern of these 3 species, south-eastern Turkey is regarded as the area of origin of the cultivated chickpea (Zohary & Hopf, 2000).

The type locality of *C. uludereensis* has been researched for observing the population size. There were hundreds of individuals between the *Quercus* scrub and openings. Furthermore, a local person, Mr. Ağın, explained that some areas in the foothills of the mountain are completely covered by this plant. He also explained that the plants are harvested and carried to settlements by tractor for feeding farm animals during the cold winter period. Unfortunately, due to unsuitable field conditions, the author has not seen these abundant populations in the foothills of Tanintanin Mt. during his last visit to the area. According to the distribution data available, it is surmised that the specimens of the species are abundant and it should be possible to find new populations in the area. Beside this, due to restricted actual collections based on the IUCN criteria (IUCN 2001), *C. uludereensis* is assigned to the category of Endangered (EN).

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APPENDIX

SELECTED SPECIMENS EXAMINED:

Cicer montbretii; Turkey. in Phrygia monte Gargaro (Kaz Dağı), *Montbret* & *Aucher-Eloy s.n.*, isotype of the species (W). Turkey: Constantinopoli, in rupestribus, 5.6.1844, *Noei Iter Orientale s.n.* (W). B1 Balıkesir: Kaz Dağı, Edremit, 24.vii.1968, *A.Pamukçuoğlu s.n.* (HUB). B1 Balıkesir: Kaz Dağı, S slope above Zeytinli, 20.v. 1991, *J.Zielinski s.n.* (HUB). C2 Muğla: Köyceğiz, Sultaniye, Ülemez Tepe, 880-950 m, opening of *Pinus brutia* forest, 23.v.1991, *A.Güner et al.* 9270, (HUB). C5 Adana: Karsantı, 21.vi.1970, *A.Pamukçuoğlu s.n.* (HUB).

Cicer floribundum; C5 Adana: Karsantı, Ardıçlı plane, c. 1400 m, 15.vii.1972, *E.Yurdakulol s.n.* (ANK). C5 Hatay: Dörtyol, Amanos Mt., under *Fagus orientalis*, c. 1350 m, 16.vi.1966, *E.Yurdakulol s.n.* (ANK).

Cicer isauricum; C3 Antalya: Akseki, 5.vi.1970, *A.Pamukçuoğlu* & *Quézel s.n.* (HUB); Antalya: Akseki, Emirhasan Beli, 7.vi.1970, *A.Pamukçuoğlu* & *Quézel s.n.* (HUB); Antalya: Akseki, Velikuyusu, 7.vi.1970, *A.Pamukçuoğlu* & *Quézel s.n.* (HUB). C3 Konya: Beyşehir, Çamlık, *Pinus nigra* forest, 1400 m, 27.v.1983, *S.Erik* 3513 & *M.Koyuncu* (HUB); Isparta: Eğridir, Kopuz Mt., 2 km South of Yaka village, mixed forest, limestone, c. 1800 m, 20.v.1973, *H.Peşmen* 3498 & *A.Pamukçuoğlu* (HUB). C3 Konya: Beyşehir, Kurucaova, between Musalla and Muslu, mixed forest, limestone, 1400-2000 m, 23.vii.1975, *H.Peşmen* 2233 & *A.Güner* (HUB). C4 Karaman: Ermenek, Göktepe, Koçbaşlı village, Çamseki Mt., stony slopes, 1500-1800 m, 23.vii.1985, *H.Sümbül* 3270 (HUB); Ermenek, Göktepe, Dumlugöze village, 950-1300 m, 13.ix.1985, *H.Sümbül* 2441 (HUB).

References

Contandriopoulos J, Pamukçuoğlu A & Quezel P (1972). A Propos des *Cicer* Vivaces du Pourtour Mediterranéen Oriental. *Biol Gallo-Hellen* 4(1): 3-18.

Davies AMR, Maxted N & van Der Maesen LJG (2007). A natural infrageneric classification for *Cicer* (Leguminosae, Cicereae). *Blumea* 52: 379-400.

Davis PH (1972). *Cicer* L. (Fabaceae). In: Davis PH (ed.), *Flora of Turkey and the East Aegean Islands*. 3: 267-274, Edinburgh: Edinburgh Univ Press.

IUCN 2001: *IUCN Red List Categories: Version 3.1*. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge.

Ladizinsky G (1975). A new *Cicer* L. from Turkey. *Notes Roy Bot Gard Edinburgh* 34(2): 201-202.

Linchevskii IA (1948). *Cicer* L. (Fabaceae). In: Komarov VL, Shishkin, BK & Bobrov BA, (eds.), *Flora USSR*. 13: 294-309. Botanicheskii Institut Akademii Nauk SSSR, Moscow and Leningrad. (Translated from Russian by Israel Program for Scientific Translations. Jerusalem 1972).

Mabberley DJ (2008). *Cicer* L. *Mabberley's Plant-Book. A Portable Dictionary of Plants, Their Classification and Uses*. Cambridge: Cambridge University Press.

Van der Maesen LJG (1972). *Cicer* L. *A Monograph of the Genus, with Special Reference to the Chickpea (Cicer arietinum* L.*), Its Ecology and Cultivation*: Meded. Landbouwhogesch. Wageningen 72(10) p. 342.

Van der Maesen LJG, Maxted N, Javadi F, Coles S & Davies AMR (2007). Taxonomy of the genus *Cicer* revisited. In: Chickpea Breeding and Management**,** Edited by SS Yadav, Indian Agricultural Research Institute, New Delhi, India, R Redden, Victoria Institute for Dryland Agriculture Horsham, Australia, W Chen, USDA-ARS, Washington State University, USA and B Sharma, Indian Agricultural Research Institute, New Delhi, India.

Townsend CC (1966). *Cicer* L. (Fabaceae). In: Townsend CC, Guest E, (eds.), *Flora of Iraq*. Vol. 3, pp. 505-512. Baghdad: Ministry of Agriculture Republic of Iraq.

Zeven AC & Zhukovsky PM (1975). *Dictionary of Cultivated Plants and Their Centres of Diversity: Excluding Ornamentals, Forest Trees and Lower Plants*. p. 219. Wageningen: Centre for Agricultural Publishing and Documentation.

Zhukovsky PM (1951). *Türkiye'nin Zirai Bünyesi*. (translated by: Celal Kıpçak, Haydar Nouruzhan, Sabir Türkistanlı). Ankara: Türkiye Şeker Fabrikaları Press. No: 20.

Zohary D & Hopf M (2000). *Domestication of Plants in the Old World: The Origin and Spread of Cultivated Plants in West Asia, Europe, and the Nile Valley*. p. 316.