Cousinia khoiensis (Asteraceae, Cardueae), a new species from north-west of Iran

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Abstract. A new endemic species (Asteraceae, Cardueae) is described as *Cousinia khoiensis* on the basis of specimens collected in West Azarbaijan Province, Iran. The distribution area of the new species belongs to the distribution range of the species of sect. *Cousinia* in the northwest of Iran. It is also morphologically similar to sect. *Cousinia*. These similarities are mainly in some characters such as the size and shape of the involucre, the number of flowers, the height of the plant and the texture of the leaves. The main differences between the new species and the members of sect. *Cousinia* in Iran are: the shape of the leaves, the number of phyllaries, the size of the capitula and the colour of the corolla. *Cousinia khoiensis* is compared with the closest species, including *C. microcephala, C. sivasica, C. woronowii* and *C. calolepis. C. sivasica* and *C. woronowii* of sect. *Cousinia* are distributed in Turkey, and *C. calolepis* belongs to sect. *Stenocephalae*. The holotype and isotype specimens of *Cousinia khoiensis* are illustrated, together with close-ups of various parts of the new species. An identification key for all taxa of sect. *Cousinia* in Iran as well as *C. sivasica* and *C. woronowii*, which is distributed in Turkey, has been provided. The number of species in the sect. *Cousinia* in Iran, including the new species, is 12. The relationship of *Cousinia khoiensis* and the related taxa was presented separately. In addition, a distribution map showing the distribution range of *C. khoiensis* and the related species is presented here.
Keywords: *Cousinia*, sect. *Cousinia*, flora of Iran, endemic.

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1. Introduction

The genus *Cousinia* Cass. belongs to the tribe Cardueae (Asteraceae) and is one of the most diverse genera in Central and Southwest Asia with about 665 species (Atazadeh & Ghahremaninejad, 2025; POWO, 2025), after *Senecio* L. (c. 1500 species) and *Vernonia* Schreb. (c. 1000 species) (Tscherneva, 1962; Rechinger, 1972, 1979; Frodin, 2004; Attar & Ghahreman, 2006; Susanna & Garcia-Jacas, 2007; Attar & Djavadi, 2010; Mehregan & Assadi, 2016; Minaeifar *et al*., 2016, Rastegar *et al*., 2017, 2018; Attar & Amini Rad, 2019; Atazadeh *et al*., 2021). The greatest diversity and distribution of this genus is found in the mountainous regions of Iran, Afghanistan and Turkmenistan, with almost 400 species in Southwest Asia, 379 of which endemic (Rechinger, 1986; Knapp, 1987; Attar & Djavadi, 2010; Atazadeh *et al*., 2020).

In Iran, *Cousinia* is mainly distributed in the Kopet Dagh, Elborz, Zagros Mountains and in the north-western regions of the country (Attar & Djavadi, 2010). In the Flora Iranica (Rechinger, 1972, 1979), *Cousinia* was artificially divided into 71 sections, 45 of which are recorded in Iran (Rechinger, 1986; Attar & Ghahreman, 2002; Mehregan & Assadi, 2010; Attar *et al*., 2024), including the sect. *Cousinia* with about 67 species of which 11 species are distributed in the northwest of Iran (Rechinger, 1970). Only a few species are distributed in the adjacent countries of Turkey and the Caucasus region (Tscherneva, 1962; Huber-Morath, 1975).

The members of the sect. *Cousinia* are more or less small plants with branched stems, with almost leathery or rarely herbaceous leaves, decurrent or not decurrent stem leaves, small or medium-sized capitula, with (5-) 10-45 flowers and a yellow or pink to purple corolla. The involucre is ovoid-oblong to broadly ovoid, rarely globose, densely arachnoid-woolly to glabrous, with small and narrow or subulate exappendiculate, erect, spreading or recurved and falcate phyllaries.

According to the Flora Iranica (Rechinger, 1972, 1979), the genus *Cousinia* comprises about 220 species in the flora of Iran. However, in recent studies (Djavadi & Attar, 2006; Djavadi *et al*., 2007; Attar *et al*., 2007, 2016; Assadi, 2009, 2010, 2011; Attar & Mirtadzadini, 2009; Attar & Djavadi, 2010; Mehregan & Assadi, 2010; Mehregan *et al*., 2010; Attar, 2011; Mirtadzadini & Attar, 2014; Rastegar *et al*., 2018; Attar & Amini Rad, 2019; Attar *et al*., 2022; Attar *et al*., 2024) several additional species of *Cousinia* have been described and recorded in the flora of Iran. Therefore, the number of species of the genus is now estimated to be about 271, which still makes it the second largest genus after *Astragalus* L. in the flora of Iran (Rastegar *et al*., 2018).

Two interesting specimens were collected in the province of West Azarbaijan as part of the *Cousinia* study project. These specimens were included in the *Cousinia* section due to their morphological similarities and their distribution range. After careful examination, it was determined that these specimens have distinct characteristics and can therefore be described as a new species. This newly described species, characterized by several characters including ovoid capitula with less than 20 flowers, longly decurrent leaves and exappendiculate phyllaries, distinguished as the only member of sect. *Cousinia* with a purple corolla in the flora of Iran.

2. Material and methods

The specimens of the new species were discovered during a trip to northwestern Iran and identified on the basis of morphological characters. We have carried out a thorough and accurate botanical work in the province of West Azarbaijan to identify the new species. After the field investigations, we collected two specimens from the existing individuals of the new species at this location and examined them as holotype and isotype. To confirm the identity, the specimens were compared with other specimens and/or images in virtual herbaria such as TUH, TARI, IRAN, K, B, M, E and W (herbaria acronyms follow Theirs 2024+). In addition, various relevant literature sources were consulted, including Flora Iranica (Rechinger, 1972, 1979), Flora of the USSR (Tscherneva, 1962), Flora of Turkey (Huber-Morath, 1975) and related publications.

3. Results and Discussion

Cousinia khoiensis Attar, Mirtadz. & Atazadeh, *sp. nov.* (Figures 1–3)

Type: Iran. Azarbaijan: Khoi: Valadian, 13.06.1997 Ghahreman & Attar, TUH20583 (Holotype & Isotype).

Perennial, ca. 20 cm high; rootstock woody with densely cottony hairs and the remnants of old petioles at the base. **Stem** grayish, covered with milky-white arachnoid hairs, divaricately branched from the base, leafy throughout, Lower branches longer than the uppers. **Basal leaves** ovate-elliptic, 3-5 cm long and 1-3 cm wide, green, densely white arachnoid on both surfaces terminating to spines with length 5 mm; **petiole** 6 mm long; **stem leaves** ovate-elliptic, 2.5–3 cm long and 1-1.5 cm wide, densely white arachnoid on both surfaces, longly decurrent. **Capitula** 15-20-flowered, peduncle 3–5 mm long; involucre ovoid, arachnoid, ca. 10 mm in diameter; **phyllaries** 32-44, exappendiculate; the outer lanceolate-linear, spreading, 3–4 mm long and 1 mm wide; the median similar to the outer but longer, spreading, 6-7 mm long and 1 mm wide, narrow and acuminate toward apex; the inner 4 mm long and 1 mm wide, erect, imbricate, dark purple on the outer surface, obtuse; the innermost longer than the inner, brownish, imbricate. **Corolla** purple, 11-12 mm long, limb 5-6 mm, **tube** 6 mm; **anthers** purple, glabrous, concolor. Receptacle bristles smooth. **Achenes** immature.

Etymology: The epithet refers to the type locality, the city of Khoi in Western Azarbaijan Province.

Phenology: Flowering: June-August

Taxonomic note

The new species is found in the northwestern Iran within the distribution range of the species of sect. *Cousinia* and is morphologically similar to them. These similarities are mainly in the size and shape of the involucre, the number of flowers, the height of the plant and the texture of the leaves. Of them, *C. microcephala* C.A.Mey. is the species most similar to the new species and whose distribution area coincides with the area of the new species. However, *C. microcephala* and all species of this section in this area have yellow corollas, whereas the corolla of the new species is purple. A little further away, in Turkey, species similar to the new species are distributed, whose corollas are yellow and red suffused. *C. sivasica* Hub.-Mor., which is distributed in the center of Turkey, resembles the new species in some morphological characters, such as the shape of the capitula and the arrangement of the phyllaries. *C. woronowii* Bornm. is the other similar species occurring in northeastern Turkey and about 250 km away from the new species. Although it has leaves with deeper incisions and deflexed (not straight) phyllaries, this species and the new species have the purple corolla. Totally, this species is morphologically most closely related to the new species. Also, *C. khoiensis* due to the small involucres and purple or pink corollas has similarities with the species of sect. *Stenocephalae* Bunge, especially *C. calolepis* Boiss. However, the members of this section are distributed in the north and north-east of Iran and far from the distribution range of the new species. They also have narrower involucres with fewer florets. A comparison of the morphological characters of the new species *C. khoiensis* and its closely related species is given in Table 1. In addition, a distribution map is also provided here showing the distribution range of *C. khoiensis* and related species (Figure 4). An identification key for all taxa of sect. *Cousinia* in Iran as well as *C. sivasica* and *C. woronowii*, which is distributed in Turkey, has been provided:

Diagnostic key to the new species and related species

1.Phyllaries subulate, recurved and falcate……2
-Phyllaries straight, spreading or imbricate……4
2.Phyllaries 65-70…… *C. tenuifolia* C.A.Mey. in DC
-Phyllaries more than 100 (rarely up to 160)……3
3. involucre densely arachnoid……*C. wilhelmineae* Rech.f.
-involucre glabrescent……*C. lomakinii* C. Winkl.
4.Leaves shortly or longly decurrent……5
-Leaves not decurrent……10
5.Involucre glabrescent…… *C. chlorocephala* C.A.Mey. in DC
-Involucre arachnoid……6
6.Phyllaries 70-120; flowers 20-40; corolla 12-15 mm ……7
-Phyllaries 30-40……8
7. Flowers 20-30; corolla, yellow or red-suffused; leaves segments linear ……*C. sivasica* Hub.-Mor.
-Flowers 25-40; corolla red to purple; leaves segments triangular……*C. woronowii* Bornm.
8.Flowers more or less 10; phyllaries more or less 60…… *C. azerbaidjanica* Djavadi, Attar & Najafi
-Flowers more than 10; phyllaries up to 45……9
9. Corolla yellow; phyllaries 40-45; leaves arachnoid, green, concolored ……*C. tabriziana* Bunge
-Corolla purple; phyllaries 32-44; leaves discolored, densely white-tomentose below ……*C. khoiensis* Attar, Mirtadz. & Atazadeh
10. Flowers 30-40……*C. hamosa* C.A.Mey. in DC
-Flowers up to 20……11
11.Phyllaries imbricate; involucre constricted above ……*C. microcephala* C.A.Mey. in DC
-Phyllaries spreading-recurved; involucre not constricted above……12
12 Involucre glabrescent…… *C. seidlitzii* C.A.Mey. in DC
-Involucre arachnoid……13

13.Leaves segments broad triangular; capitula 9-12 mm in diam.....…*C. hohenackeri* Fisch. & C.A.Mey.
-Leaves segments linear; capitula 12-15 mm in diam. ……..……*C. urumiensis* Bornm.

Appendix. Other examined specimens

Cousinia calolepis Boiss.:
Iran. Qazvin, Alamut, between Gazorkhan and Khoshkechal, 2500 m asl, Ghahreman & Mozaffarian TUH9972; Qazvin, Alamut, 30 km after Qazvin toward Rajai-Shahr, 2350 m asl, Saber & Zarrei, TUH34378; Qazvin, Alamut, Gazorkhan, TUH27626.

Cousinia microcephala C.A.Mey.:
Iran. East Azerbaijan, Sufian to Shabestar, 1400 m asl, K. H. Reichinger 43600 (K2037283) (Photo!)
Iran. East Azerbaijan, Sufian region, Attar, Maroofi & Zamani TUH38313; Iran. East Azerbaijan, Shabestar, Sharafkhaneh, Ahmad-Khanbeygi TUH38318; Iran. East Azerbaijan, Sufian to Shabestar, Ahmad-Khanbeygi TUH38317; Iran. East Azerbaijan, Marand to Evoghli, 1250 m asl, Ghahreman & Mozaffarian TUH9772. Iran, Azarbaijan, Khoi, near Seidchadschi, Szovitz (G-DC, type specimen).

Cousinia sivasica Hub.-Mor.:
Turkey. B6 Sivas, 36 km S Kangal, 1600 m asl. 2.8.1976, F. Sorger s.n. (W). B6 Malatya, 36 km S Kangal, E Kürecik, W der Passhöhe, 1800 m asl. 1.9.1977, F. Sorger s.n. (W).

Cousinia woronowii Bornm.:
Turkey. B9 Erzurum, c. 30 km from Horasan to Tahir, Davis W47300.

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Figure 1. Holotype of Cousinia khoiensis.

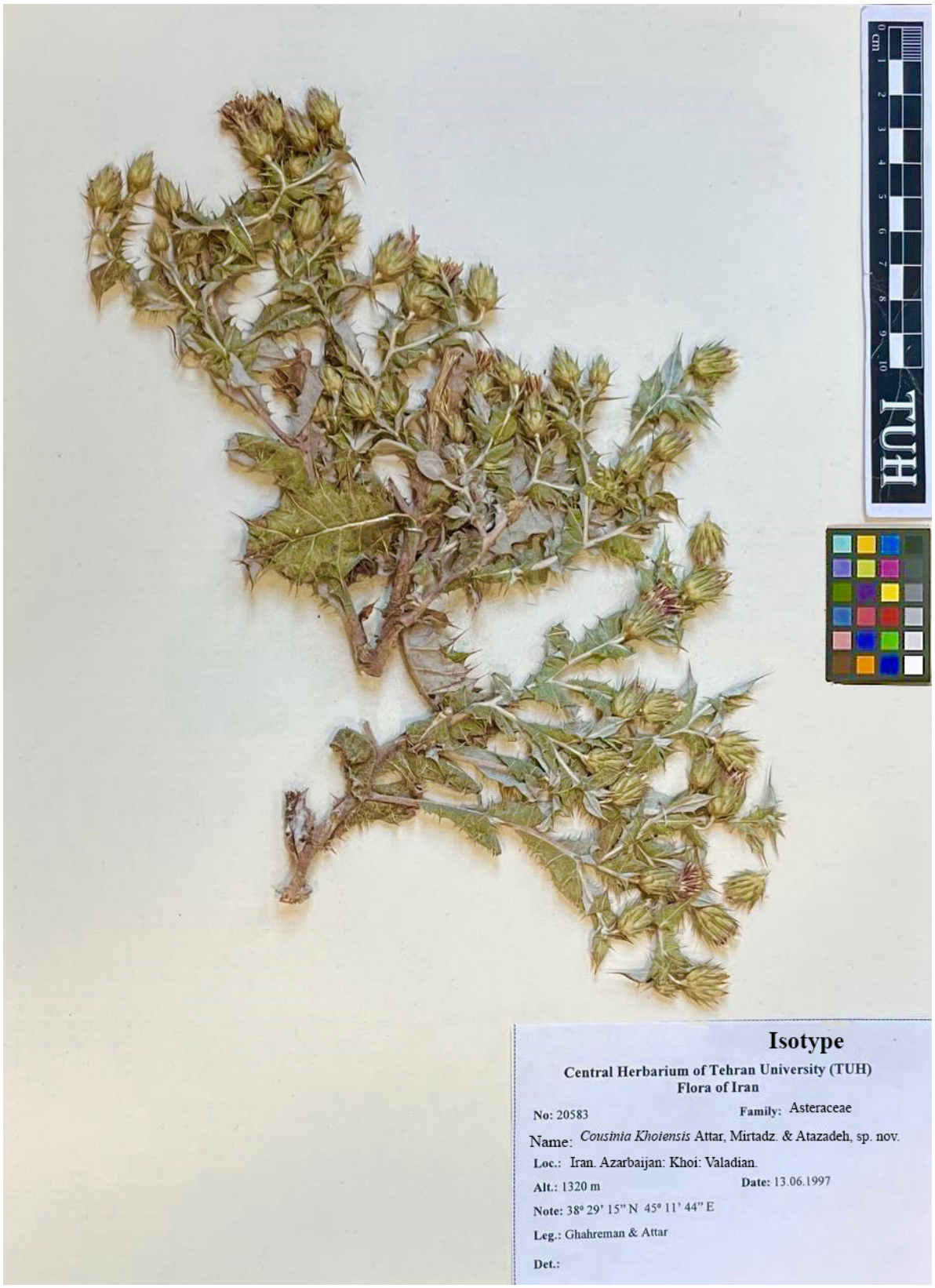

Figure 2. Isotype of *Cousinia khoiensis*.

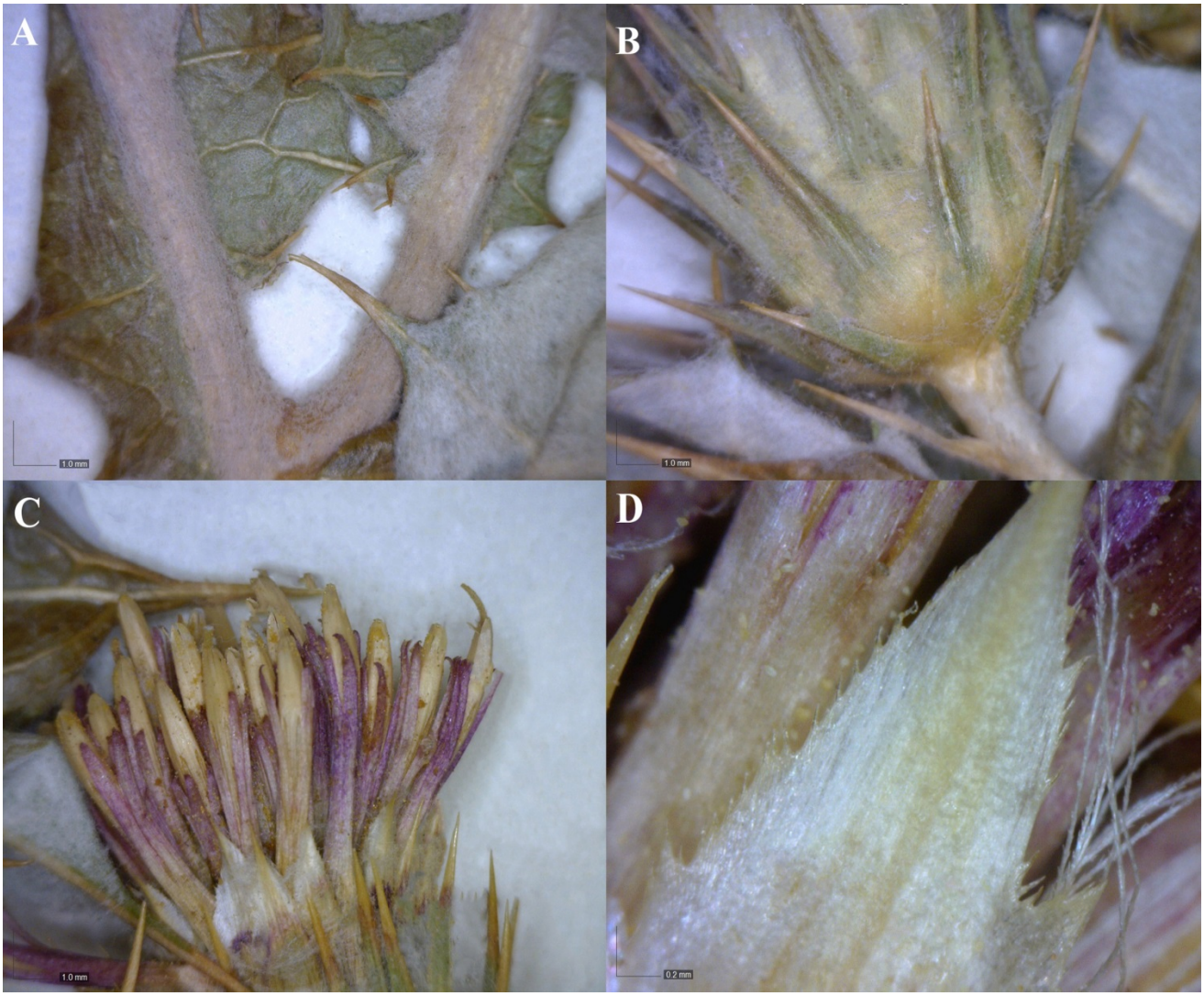

Figure 3. Morphological details of *Cousinia khoiensis*. A: Stem; B: Involucre and phyllaries arrangement; C: flowers; D: Innermost phyllaries. A, B and C, Scale bars= 0.1 mm; D Scale bars=0.2 mm.

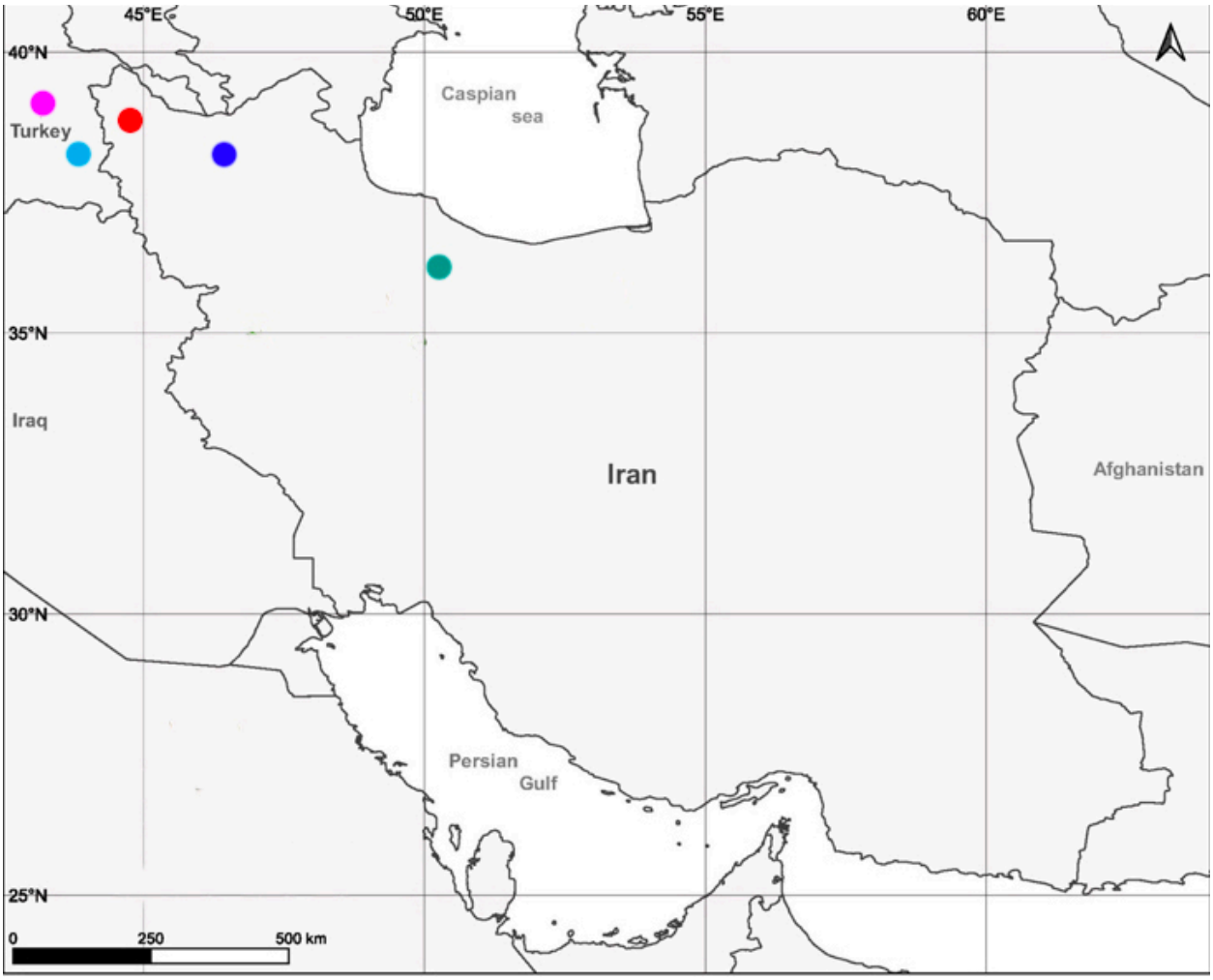

Figure 4. Distribution map of *Cousinia khoiensis* (□), *C. microcephala* (□), *C. sivasica* (□), *C. woronowii* (□) and *C. calolepis* (□).

Table 1. Morphological comparison of *C. khoiensis*, *C. microcephala, C. sivasica*, *C. woronowii* and *C. calolepis.*

Characters	*C. khoiensis*	*C. microcephala*	*C. sivasica*	*C. woronowii*	*C. calolepis*
Plant height (cm)	20	15-50	10-20	25-40	30-35
Stem color	grayish	light brownish	light brownish	light brownish	brownish
Leaves texture	herbaceous	leathery	leathery	leathery-herbaceous	leathery
Leaves shape	ovate-elliptic	lanceolate/pinnatisect	lanceolate/pinnatisect	linear-lanceolate	lanceolate
No of flowers	15-20	9-15	20-30	25-40	6-11
No of phyllaries	32-44	35-40	70-120	100-120	44-56
Phyllaries arrangement	spreading	strongly imbricate	spreading	spreading	imbricate-slightly recurved at tip
Capitula shape	ovoid	ovoid-strongly constricted above	ovoid	ovoid	cylindrical
Capitula size (mm)	13 × 8-10	9-11× 6-8	25-27× 18-20	23-25× 15-20	10× 5-8
Involucre diameter (mm)	8-10	6-8	18-20	15-20	5
Corolla color	purple	yellow	red/yellow	purple	purple
Corolla length (mm)	11-12	11-12	12-15	13-15	10-11
Innermost phyllaries color/indumentum on Adaxial side	white/smooth	yellow/ papillose-scabrous	white/smooth	white/smooth	purple/papillose