

THE GENUS *CENTAUREA* (ASTERACEAE, CARDUEAE) IN IRAN: TWO NEW SPECIES AND A LECTOTYPIFICATION

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Two new species of *Centaurea* sect. *Cynaroides* (Asteraceae) from western Iran, *C. shehbazii* Ranjbar & Negaresh and *C. solitaria* Ranjbar & Negaresh, are described. In addition, *Centaurea aziziana* is typified.

Keywords. *Centaurea*, Iran, lectotypification, new species, section *Cynaroides*, section *Phalolepis*.

INTRODUCTION

According to Wagenitz (1980) the genus *Centaurea* s.l. consists of 89 species in 28 sections of which 70 species are found in Iran. Twenty species, seven subspecies and two varieties are endemic to Iran.

Following on from our previous research on *Centaurea* L. (Asteraceae, Cardueae) in Iran (Ranjbar & Negaresh, 2012, 2013a, 2013b; Ranjbar *et al.*, 2012, 2013a, 2013b), and in the course of recent collecting activities in western Iran, we have identified two new interesting species from *Centaurea* sect. *Cynaroides* Boiss. ex Walp.

In addition, we designate a lectotype for *Centaurea aziziana* Rech.f. from *Centaurea* sect. *Phalolepis* (Cass.) DC., a small section in Iran with two species.

SPECIES DESCRIPTIONS

1. *Centaurea shehbazii* Ranjbar & Negaresh, **sp. nov.** (Sect. *Cynaroides*).

Centaureae regiae subsp. *regiae* affinis, sed foliis basalibus late lanceolatis, cartilagineodentatis (nec ovato-subcordatis vel raro lyratis), foliis caulinis superioribus oblongo-ellipticis (nec lanceolatis), involucri phyllis dense lanato-tomentosis (nec glabrescentibus), appendicibus magnitudine mediis, phyllorum ungues non omnino obtegentibus (nec magnis, phyllorum ungues omnino obtegentibus), phyllorum mediorum appendicibus ovato-triangularibus, 13–16 × c.18 mm, atropurpureis ad nigris in parte centrali (nec late ovatis, 20–25 × 20–25 mm, albidis), appendicibus exterioribus triangularibus, nigris (nec ovatis, albidis), ciliis utrinque 8–12 (nec 10–17),

spinis terminalibus appendicum mediorum (3–)5–8 mm (nec (8–)9–14 mm) longa, pappo exteriore 15.5–16 mm (nec 10–13 mm) longo differt. – Type: Iran, Kermanshah, 5 km to Ravansar, Baveh Geh village, 1420 m, 30 v 2012, *Ranjbar & Negaresh* 28805 (holo BASU!).

Biennial with thick fleshy taproot, whole plant usually green, up to 60 cm tall. *Stem* erect, usually simple, c.12 mm in diam. at the base, cylindrical, with thick white striations, loosely leafy to median part, lower part reddish, subglabrous to sparsely hirsute-articulate hairy, up to 1.5 mm long, median part loosely covered with hirsute-articulate and sessile glandular hairs, upper part loosely arachnoid with a mix of hirsute-articulate and sessile glandular hairs, sometimes only with sessile glandular hairs. *Leaves* stiff, papyraceous (on drying), with prominent veins on both sides, almost covered with hirsute-articulate hairs, denser along midrib and veins, up to 0.7 mm long, and sessile glandular hairs, margins scabrous. *Basal leaves* simple, c.30 × 12 cm, broadly lanceolate, with a c.12 cm long petiole, acute at apex, cartilaginously dentate. *Lower cauline leaves* simple, 27–33 × 13–14 cm, broadly ovate or broadly ovate-lanceolate, with a 7.5–12.5 cm long petiole, acute at apex, entire or cartilaginously dentate. *Median cauline leaves* sessile, narrowly decurrent up to 1.8 cm along stem, oblanceolate or ovate-lanceolate, 15–20 × 6–10.5 cm, acute at apex, entire. *Upper cauline leaves* increasingly smaller, sessile, c.9.5 × 3.7 cm, oblong-elliptic, loosely covered with a hirsute-articulate mix of arachnoid hairs, obtuse at apex, narrowly decurrent up to 1.2 cm along stem. *Capitula* 5(–7), arranged in a raceme, peduncles naked, upper ones 9–16 cm long. *Involucre*s ovoid-globose or ovoid, truncate at base, 40–45 × 30–40 mm. *Phyllaries* multiseriate, green (in dry state yellow-greenish), imbricate, coriaceous, densely covered with lanate-tomentose appressed hairs. *Outer phyllaries* oblong, 3.5–8 × 8.2–9.8 mm; *appendages* shortly ovate, c.9 × 15–16 mm (including cilia and spine), straw-coloured with purple striations or purple throughout. *Median phyllaries* oblong or rectangular, 12–17 × c.12 mm; *appendages* ovate-triangular, 13–16 × c.18 mm (including cilia and spine), deep purple to blackish in central part. *Inner phyllaries* lanceolate-oblong or lanceolate-linear, 21–36 × 10–14 mm; *appendages* triangular, 12–15 × 4–15 mm, blackish. *Appendages* medium-sized, concealing basal part of phyllaries, chartaceous, not decurrent; *cilia* narrowly triangular, white or white-purple, numerous, 8–12 on each side, 1–6 mm long; *spines* rigid, reddish or blackish, triangular, (3–)5–8 mm long, equal to or longer than the adjacent cilia. *Flowers* rose; *central florets* hermaphroditic, c.65 mm long, corolla c.19 mm long, 5-lobed, lobes ± 8.5 mm long; *peripheral florets* sterile, finely, not radiant, 4-lobed, limb lobes linear, c.9 mm long. *Achenes* oblong, 6.2–6.5 mm long, 2.2–3.2 mm wide, yellowish, glabrescent, hilum 0.8–1 mm long. *Pappus* persistent, double, multiseriate, scabrous, whitish or pale brown; *outer pappus* c.15.5–16 mm long; *inner pappus* shorter, c.6 mm long.

Etymology. This species is named in honour of Dr Ihsan Al-Shehbaz.

Phenology. Flowering in May and fruiting in May to June.

Distribution and habitat. *Centaurea shehbazii* is a rare endemic of western Iran and to our knowledge grows only on rocky slopes, roadsides and fallow fields at an altitude of 1350–1550 m around Baveh Geh village near Ravansar in Kermanshah province. It grows along with *Avena barbata* Pott ex Link subsp. *barbata*, *Centaurea amadanensis* Sch.-Bip. var. *gymnoclada* (Jaub. & Spach) Wagenitz, *Centaurea behen* L., *Centaurea regia* Boiss. subsp. *regia*, *Phlomis olivieri* Benth., *Scabiosa rotata* M.Bieb. and *Zoegea leptaura* L.

2. *Centaurea solitaria* Ranjbar & Negaresh, sp. nov. (Sect. *Cynaroides*).

Centaureae regiae subsp. *regiae* affinis, sed foliis caulinis inferioribus rhombicis vel rhombico-lanceolatis, denticulatis, 4.3–4.4 cm latis (nec late lanceolatis, integris vel in parte inferiore pinnatilobatis, c.10 cm latis), capitulo solitari (nec capitulis pluribus, in racemis dispositis), involucro globoso-ovoideo, c.35 × 38 mm (nec subgloboso, 40–55 × 40–60 mm), involucri phyllis dense tomentosus (nec glabrescentibus), appendicibus exterioribus triangularibus (nec ovatis), appendicibus phyllorum mediorum triangularibus, 16–18 × 13–16 mm, brunneis (nec late ovatis, 20–25 × 20–25 mm, albidis), appendicibus interioribus anguste lanceolatis, brunneopurpureis (nec ovatis, albidis), ciliis utrinque 4–8 (nec 10–17), spinis terminalibus appendicum mediorum 5–9 mm (nec (8–)9–14 mm) longis differt. – Type: Iran, Kermanshah, Ravansar, 1380 m, 14 vi 2012, *Ranjbar & Negaresh* 28821 (holo BASU!; photo B).

Biennial plants, collar of fibrous petiolar remains present at base of stem, c.65 cm tall. *Stem* erect, always simple, yellowish, c.6 mm in diam. at the base, cylindrical, with thin white striations, sparsely leafy, lower part subglabrous to sparsely short hirsute-articulate hairy, median part sparsely covered with hirsute-articulate hairs, up to 0.8 mm long, and sessile glandular hairs, upper part sparsely arachnoid, sometimes a mix of scattered hirsute-articulate and sessile glandular hairs. *Leaves* rigid, papyraceous (on drying), smallish, rather densely covered with short hirsute-articulate hairs, especially along midrib and veins, up to 0.8 mm long, and sessile glandular hairs, margins subscabrous. *Basal leaves* unknown. *Lower cauline leaves* simple, sometimes withered when flowering, 18–23.5 × c.4.3–4.4 cm, rhombic or rhombico-lanceolate, narrowed at each end, petioles 6.5–11.5 cm long, acuminate at apex, denticulate. *Median cauline leaves* sessile, decurrent, up to 3 cm along stem, oblong, 7.7–14 × 1.5–2.8 cm, acuminate at apex, entire, rarely denticulate. *Upper cauline leaves* successively smaller, sessile, 2.7–3 × 0.3–0.65 cm, linear or bract-like, densely covered with a hirsute-articulate mix of scattered arachnoid hairs, narrowly decurrent up to 0.8 cm along stem. *Capitula* solitary, peduncle up to 3.7 cm long; *involucre*s globose-ovoid, c.35 × 38 mm. *Phyllaries* multiseriate, green or reddish above, imbricate, coriaceous, densely covered with tomentose hairs. *Outer phyllaries* oblong, 3.5–5 × 5–6.5 mm; *appendages* triangular, 13–14 × c.12 mm (including cilia and spine), straw-coloured. *Median phyllaries* oblong-lanceolate, 7–11 × 8–9.5 mm; *appendages* triangular, 16–18 × 13–16 mm (including cilia and spine), brownish. *Inner phyllaries* lanceolate, 15–20 × c.10 mm; *appendages* narrowly lanceolate, 15–18 × 9–14 mm (including cilia and spine), brown

to purple. *Appendages* medium-sized, concealing major part of phyllaries, chartaceous, not decurrent; *cilia* narrowly triangular, subreflexed, numerous, 4–8 on each side, 1.5–6.5 mm long; *spines* narrowly triangular, 5–9 mm long, longer or \pm equal to the adjacent cilia. *Flowers* purple-rose; *central florets* hermaphroditic, 48–50 mm long, corolla c. 16–17 mm long, 5-lobed, lobes 7.2–8 mm long, with yellow nerves; *peripheral florets* finely, not radiant, 4-lobed, limb lobes linear, c. 8 mm long. *Achenes* oblong, 6.3–7.3 mm long, 3.2–3.8 mm wide, smooth and shiny, yellowish, rounded at apex, glabrescent, hilum 0.7–1 mm long. *Pappus* persistent, double, multiseriate, scabrous, whitish; *outer pappus* 13–14 mm long; *inner pappus* shorter, 5–7 mm long.

Etymology. The specific epithet *solitaria* means ‘capitule solitary’.

Phenology. Flowering in May to June and fruiting in June.

Paratypes. Iran, Kermanshah, 25 km to Ravansar, 1450 m, 25 vi 2012, *Ranjbar & Negaresh* 28848 (BASU!), 28842 (BASU!).

Distribution and habitat. *Centaurea solitaria* is a rare endemic of western Iran and to our knowledge grows only on clay slopes and in fallow fields around Ravansar in Kermanshah province. It grows along with *Avena barbata* Pott ex Link subsp. *barbata*, *Centaurea behen* L., *Centaurea regia* Boiss. subsp. *regia*, *Echinops* sp., *Scabiosa rotata* M.Bieb. and *Zoegea lepturea* L.

Relationships

Centaurea shehbazii and *C. solitaria* belong to *Centaurea* sect. *Cynaroides*, which includes taxa that often have solitary capitula or racemose synflorescences, decurrent upper cauline leaves, subglobose involucre, triangular to ovoid or orbicular appendages which are not decurrent, usually ciliate and ending in a firm spine or spinule, and with rose or purple or yellow flowers (Ranjbar *et al.*, 2013b). *Centaurea shehbazii* is similar to *C. regia* subsp. *regia* in having decurrent upper cauline leaves and in the shape of the inflorescence, the colour of the flowers and the length of the achenes. *Centaurea shehbazii* differs from *C. regia* subsp. *regia* in the characters listed in Table 1.

Centaurea shehbazii is also similar to *C. haradjianii* Wagenitz (*Haradjian* 615), endemic to Turkey, in characters such as the texture and indumentum of the leaves, the racemose inflorescence, and the appendages only partly concealing the basal part of the phyllaries, but differs from it by having lower cauline leaves broadly ovate or broadly ovate-lanceolate and entire or cartilaginously dentate (vs. oblong-cordate, entire), median cauline leaves oblanceolate or ovate-lanceolate (vs. lanceolate), upper cauline leaves oblong-elliptic (vs. linear-lanceolate), involucre 40–45 \times 30–40 mm (vs. 25–28 \times 17–25 mm), phyllaries indumentum densely lanate-tomentose (vs. glabrescent), median and inner appendages deep purple to blackish (vs. dark brown), cilia 8–12 (vs. 7–9) on each side, and also pappus 15.5–16 mm (vs. c. 9 mm) long.

TABLE 1. Diagnostic morphological characters of *Centaurea shehbazii*, *C. solitaria* and *C. regia* subsp. *regia*

Character	<i>C. shehbazii</i>	<i>C. solitaria</i>	<i>C. regia</i> subsp. <i>regia</i>
Stem indumentum	Lower part subglabrous to sparsely hirsute-articulate, median part loosely hirsute-articulate, upper part a loosely arachnoid mix of hirsute-articulate and sessile glandular hairs, sometimes only sessile glandular	Lower part subglabrous to sparsely short hirsute-articulate, median part sparsely hirsute-articulate, upper part sparsely arachnoid, sometimes a mix of scattered hirsute-articulate and sessile glandular hairs	Arachnoid-tomentose, finally glabrescent
Basal leaves	Broadly lanceolate, cartilaginously dentate ?	?	Ovate-subcordate, rarely lyrate
Lower cauline leaves	Broadly ovate or broadly ovate-lanceolate, entire or cartilaginously dentate, c. 13–14 cm wide	Rhombic or rhombic-lanceolate, denticulate, 4.3–4.4 cm wide	Broadly lanceolate, entire or in lower part pinnatifid, c. 10 cm wide
Upper cauline leaves shape	Oblong-elliptic	Linear or bract-like	Lanceolate
Capitula	5(–7), arranged in a raceme	Solitary	Numerous, arranged in a raceme
Involucres	Ovoid-globose or ovoid, 40–45 × 30–40 mm	Globose-ovoid, c. 35 × 38 mm	Subglobose, 40–55 × 40–60 mm
Phyllaries indumentum	Densely lanate-tomentose	Densely tomentose	Glabrescent
Outer appendages	Shortly ovate, straw-coloured with purple striations or purple throughout	Triangular, straw-coloured	Ovate, white
Median appendages	Ovate-triangular, 13–16 × c. 18 mm, deep purple to blackish in central part	Triangular, 16–18 × 13–16 mm, brownish	Broadly ovate, 20–25 × 20–25 mm, white
Inner appendages	Triangular, blackish	Narrowly lanceolate, brown to purple	Ovate, white
Appendages	Medium sized, only partly concealing basal part of phyllaries	Medium sized, concealing major part of phyllaries	Large, totally concealing phyllaries
Cilia number	8–12	4–8	10–17
Median appendages spine length	(3)5–8 mm	5–9 mm	(8)9–14 mm
Pappus length	15.5–16 mm	13–14 mm	10–13 mm

Centaurea solitaria is similar to *C. regia* subsp. *regia* in the indumentum of the leaves, the shape of the median cauline leaves, and the shape of the achenes and the pappus, but differs by the characters listed in Table 1.

LECTOTYPIFICATION

Centaurea aziziana Rech.f. (Sect. *Phalolepis*), Österr. Bot. Zeitschr. 97: 255 (1950).
– Type: Iran, Prov. Mazandaran, Kojur, between Zonus and Kinch, 1300–1600 m, *Rechinger* 6576 (lecto W!, designated here; isolecto B!, BM!, E!, K!, MO!, NYBG!, S!, US!, photo BASU!).

Distribution. Iran (Mazandaran and Azerbaijan provinces). It has also recently been reported for Turkey (Armağan & Ünal, 2009).

Specimens examined. IRAN. Prov. Azerbaijan: Siah Rud toward Kaleybar, after Masan village, before Kalaleh village, 380 m, 25 v 2011, *Ranjbar & Negaresh* 26244 (BASU!); Ahar to Meshkin Shahr, 36 km to Meshkin Shahr, 1106 m, 25 vi 2012, *Ranjbar & Negaresh* 29352 (BASU!).

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