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***Jurinea gedrosiaca* (Asteraceae, Cardueae), correctly belongs to *Tricholepis* (Asteraceae, Centaureinae)**

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Abstract

In the frames of our research on the genus *Jurinea* (Carduinae), the taxonomic status of some species has been checked. In this study, evidences are presented to support transferring the species *Jurinea gedrosiaca* to *Tricholepis*, a genus in Centaureinae. Furthermore, it is demonstrated that *J. gedrosiaca* is conspecific with *T. edmondsonii* described around 40 years later. Consequently, the correct name of the taxon is *Tricholepis gedrosiaca*, and the respective combination is presented. An improved description, photos and distribution map of the species are also provided.

Keywords: Centaureinae, Compositae, flora of Iran, plant taxonomy, synonymy

Introduction

The genus *Jurinea* CASS. (Asteraceae) includes about 200 species and is a member of tribe Cardueae and subtribe Carduinae (SUSANNA et al. 1995; SUSANNA & GARCIA-JACAS 2009). The taxonomy of Iranian species currently belonging to *Jurinea* has been studied by MIRTADZADINI (2011), who proposed to re-evaluate the taxonomic status of some species including *Jurinea gedrosiaca* BORNH. based on their morphology. Concordantly, palynological studies by BORDBAR & MIRTADZADINI (2015) and karyotype analysis by PARISHANI et al. (2014) suggested the segregation of *J. gedrosiaca* from *Jurinea*. The palynological studies showed subulate pollen grains with echinate-microreticulate ornamentation for *J. gedrosiaca*, which differs from the pollen grains of the majority of *Jurinea* species.

Materials and Methods

Morphological studies were carried out on collected specimens of *Jurinea gedrosiaca* and *Tricholepis edmondsonii* RECH. f. from their type localities or close locations (preserved in the herbarium MIR). The photo of the type of *J. gedrosiaca* in the online database of Berlin herbarium (<http://herbarium.bgbm.org/object/B100088435>) was analyzed. For more precision, field studies were performed on their populations in their habitats. In

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addition, herbarium specimens were studied in the herbaria MIR, W and G. Herbarium acronyms follow THIERS (2018).

As *Tricholepis edmondsonii* showed high affinity with *J. gedrosiaca*, for better study of the relationship, individuals of several populations belonging to this species from its type locality and adjacent areas as well as the specimens of *T. edmondsonii* were precisely studied.

Results and Discussion

The findings by MIRTADZADINI (2011) and additional studies based on more field works, morphological and ecological evidences presented here demand the segregation of *J. gedrosiaca* and its placement in the genus *Tricholepis* DC. (DE CANDOLLE 1833), within the subtribe Centaureinae. Moreover, the description of this species having been inadequate especially regarding the reproductive part, the receptacle, the achene, and the leaves margin is improved.

Morphology and Phytogeography

Jurinea gedrosiaca was described by BORNMÜLLER based on a specimen collected by Alfons and Agnes Gabriel (Fig. 1) from SE of Iran (BORNMÜLLER 1936). The specimen collected by the first author near the type locality (Fig. 2) was in accordance with the original description by BORNMÜLLER. The traits of this specimen are in accordance with the description for *Tricholepis* as well (RECHINGER 1980). The following characters of *J. gedrosiaca* are similar *Tricholepis* species: small leaves, narrow linear or linear-lanceolate involucre bracts with a long tip, long bristles on receptacle and lateral insertion of areole (Fig. 3). However, the involucre bracts in *Jurinea* are linear or linear-lanceolate, acute without long tip and receptacle is scaly and no bristles are observed on it. The achene is with basal or lateral-basal areole.

The type specimen of *J. gedrosiaca* is conserved in the herbarium B (Botanischer Garten und Botanisches Museum Berlin-Dahlem). It has been emphasized in Flora Iranica (RECHINGER & WAGENITZ 1979) that the type specimen (Fig. 1) was damaged during the Second World War due to a bomb raid that hit the herbarium. Hence, it became even more difficult to determine its generic affiliation. Therefore, RECHINGER and WAGENITZ (1979) followed BORNMÜLLER (1939) and retained the species in the genus *Jurinea*. Subsequently, RECHINGER examined the specimen collected by Assadi et al. from south of Iran, near to the Mt. Khabr (ca. 200 km far from the type locality of *J. gedrosiaca*) and correctly assigned it to *Tricholepis*, describing another species of the same genus, *Tricholepis edmondsonii* (RECHINGER 1980).

Based on morphological studies of the collected specimens of these two species, it was concluded that the morphological traits including characters of leaves, stems, capitula and their other parts are similar. There is no conspicuous difference among them. In this study, the leaves of all specimens showed some variation in the margin. In the descriptions of *J. gedrosiaca* (BORNMÜLLER 1936) and *T. edmondsonii* (RECHINGER 1980), it is mentioned that the leaves have entire margin, whereas there are various leaves with entire to dentate margins in the specimens of all populations of both *J. gedrosiaca* and *T. edmondsonii*.



Fig. 1: Holotype specimen of *Tricholepis gedrosiaca* (former *Jurinea gedrosiaca*), photo from BGBM online database.



Fig. 2: Old and alive heads belonging to *Tricholepis gedrosiaca* (former *T. edmondsonii*), Mirtadzadini 1282 (MIR). Scale bar = 3 cm.

Ecology and Biogeography

In addition to morphology, the type localities of the two species as well as other localities of both species are sharing similar ecological conditions. Although the type locality of *J. gedrosiaca* has slightly dryer climate than the locality of *T. edmondsonii* because of its proximity to the Lut desert. The elevations of both localities are about 1200 m a.s.l. and both areas are covered with scattered bushes and shrubs. Both species have green and slender stems and small leaves, an adaptation to the arid climate. In summer, most leaves are shed, probably due to low humidity and high temperature.

According to ZOHARY (1979), in these two areas elements of the two phytogeographical Irano-Turanian and Nubo-Sindian regions can be found. The localities are in the

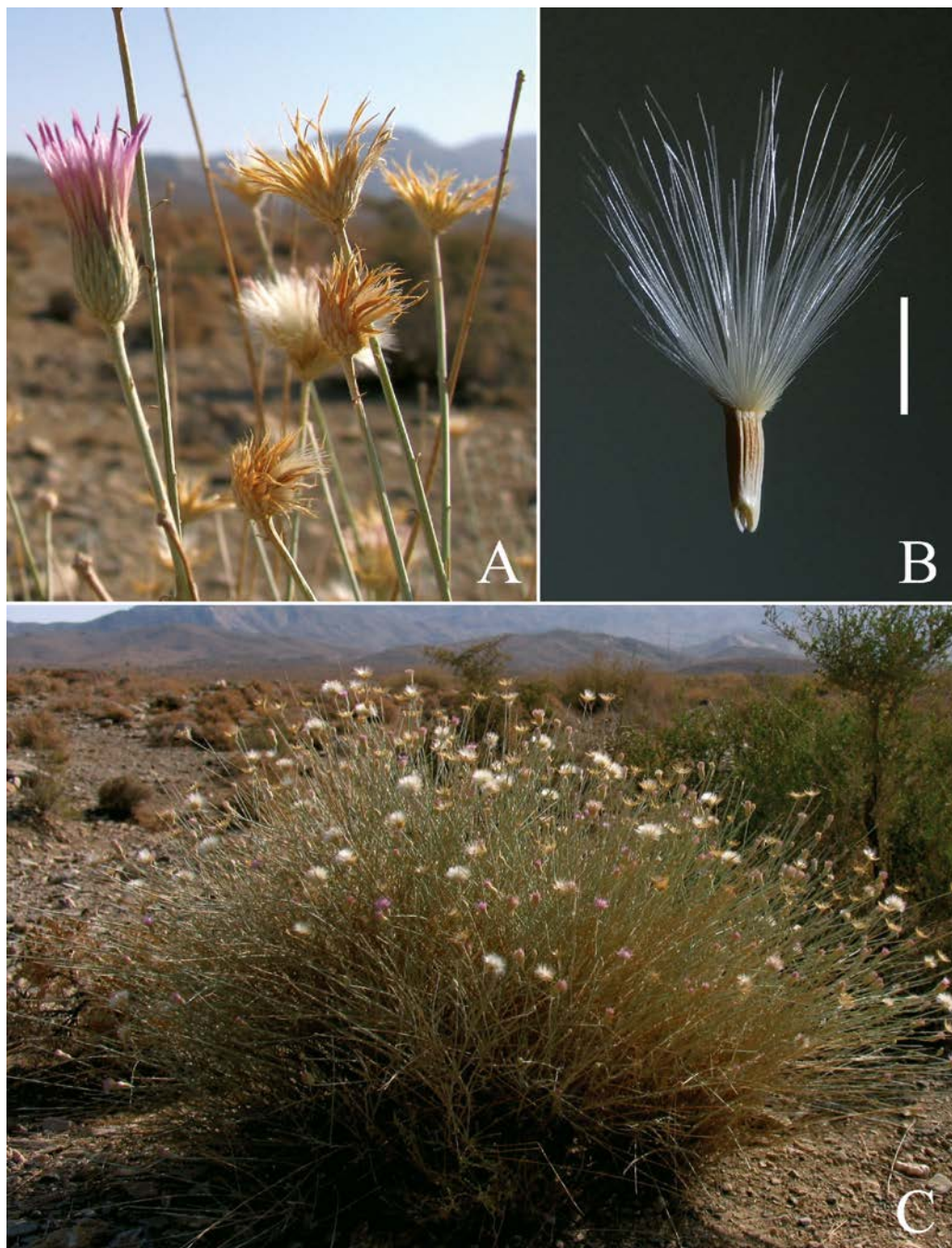


Fig. 3: *Tricholepis gedrosiaca* (former *T. edmondsonii*): (A) some heads in nature, (B) achene and (C) habitat of plant. Scale bar = 5 mm.

transitional zones of these two floristic regions. The accompanying species: *Artemisia sieberi* BESSER, *Acantholimon scorpius* (JAUB. et SPACH) BOISS., and *Amygdalus eburnea* SPACH are Irano-Turanian elements; *Grantia* sp., *Haloxylon salicornicum* (MOQ.) BUNGE ex BOISS. and *Cymbopogon jwarancusa* (JONES) SCHULT. are Nubo-Sindian elements. *Cousinia stocksii* C. WINKL., *Astragalus fasciculifolius* BOISS. and *Otostegia persica* (BURM.) BOISS. belong to the transitional zone. The ecological conditions of other localities of the species are more or less similar.

Phenology

Jurinea gedrosiaca is phenologically similar to *Tricholepis edmondsonii* but differs from other *Jurinea* species (MIRTADZADINI 2011). The flowering time for this species is July and August, whereas flowering time for most species of *Jurinea* is May and June, only in some rare cases extending to August (in mountainous and cold areas) and more rarely to September (mountain areas of higher altitude).

Taxonomy

Based on all the results presented above and the palynological studies by BORDBAR & MIRTADZADINI (2015) as well as the karyotype analysis by PARISHANI et al. (2014), it can be stated that *Tricholepis edmondsonii* and *Jurinea gedrosiaca* refer to the same species. The oldest available epithet in the rank of species is ‘*gedrosiaca*’, and the species has to be placed within the genus *Tricholepis*. Hence, *Tricholepis gedrosiaca* is the correct name, and *Tricholepis edmondsonii* is a synonym.

Tricholepis gedrosiaca (BORN.M.) MIRTADZ., PARISHANI & BORDBAR, comb.n.

≡ *Jurinea gedrosiaca* BORN.M., Beih. Bot. Centralbl. 59, E: 303 (1939).

Type: Baludshistan, Izinker, Narmashir, 600 m 27. 4. 1937, A. Gabriel & A. Gabriel (Iter Irano-gedrosiacum a. 1937) 10 [holotype B100088435 scan!, Fig. 1].

= *Tricholepis edmondsonii* RECH.f., Fl. Iran. 139b: 306 (1980).

Type: Iran, Prov. Kerman, between Khabr and Ebrahimabad, 33 km from Khabr, 1700–1900 m, 28°40'N, 56°10'E, 10. 6. 1977, Assadi, Edmondson & Miller 1913 [holotype G00304750 scan!, isotypes E00470418 scan!, TARI].

Plant sub-shrub, many-stemmed, broom-like and branched from the base, ± 50 cm high. Indumentum white tomentose, ± appressed. Stems furrowed, long and slender; stems of previous year persistent. Leaves along the stems, linear, acute, appressed or erect, entire or with large and scattered teeth, 1–6 mm × 5–30 mm, gradually become smaller toward above; upper leaves deficient and more or less inconspicuous. Heads solitary at end of branches, mostly falling after fruit ripening. Involucre ovoid, 15–20 mm long, campanulate in dried stage; most phyllaries narrow linear-lanceolate, leathery, ca. 1 mm wide, completely imbricate, covered with white tomentose hairs, terminating to an appressed attenuate straw-yellow bristle with length ca. 2 mm; scabrous at the margin; interior phyllaries linear, thinner, slightly purple at above. Corolla pink, ± 17 mm long. Achene rod-shape-obpyramidal, whitish or white with longitudinal purple ribs, ca. 5 mm long; areole elliptic with longer diameter ca. 1 mm. Pappus whitish, ± scabrous, ± 15 mm long.

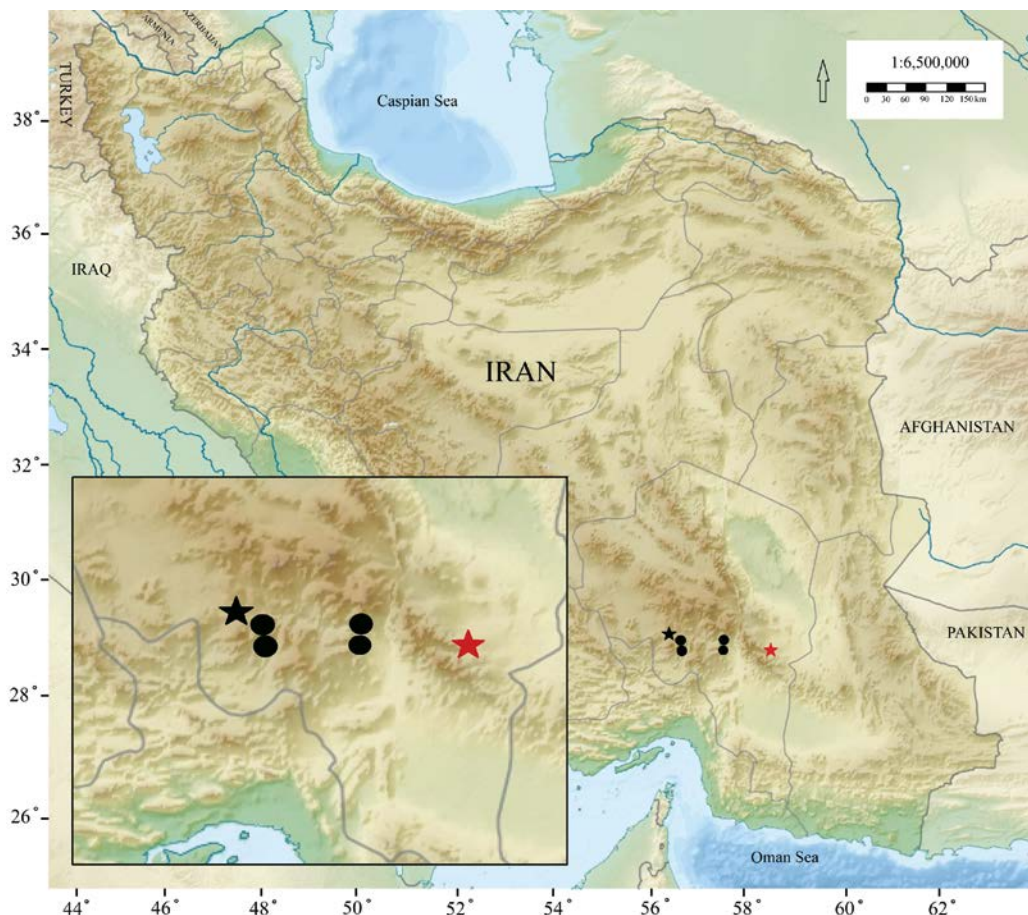


Fig. 4: Geographical distribution of *Tricholepis gedrosiaca*. Holotype of *Tricholepis edmondsonii* (black star); *Tricholepis gedrosiaca*, (Mirtadzadini 1282) – near locality of holotype of *Jurinea gedrosiaca* (red star); other specimens (black circle).

Distribution: Scattered and more or less rare bushes in SE of Iran, southern central of Kerman province, in steppes or on the along border of seasonal streams (Fig. 4).

Additional specimens of *Tricholepis gedrosiaca* examined: Iran: S, Kerman, Orzu, Zanjiraviz, 03.V.2003, Mirtadzadini 2387 [MIR]; – Kerman, Khabr, Tshahkonar, 25.VII.2008, Mirtadzadini 1081 [MIR]; – Kerman, Jiroft, Ramun, 17 km NW of Narab, Qale-Rigi, N 28.95557°, E 57.40255°, 1553 m, 24.V.2012, Mirtadzadini 2386 [MIR]; – Kerman, 44 km from Jiroft to Esfandaqe, N of Tshelitan, near radio tower, 1600 m, near the point: N 28° 44' 50.36", E 57° 23' 28.47", 08.V.2014, Mirtadzadini 2385 [MIR]; – Kerman, Bam, Seiedi hot spring road, 03.VI.1998, Mirtadzadini 1282 [MIR]; – Kerman, between Esfandaqe and Baft, 05.V.1977, Iranshahr et al. 37423 [W].

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