

## ***Gundelia rosea* (Compositae), a new record from Iran**

E. Vitek\* & J. Noroozi\*\*

### **Abstract**

*Gundelia rosea* is stated as well defined species different from *G. tournefortii*. It is first time reported from Iran, the characters are discussed.

**Key Words:** Flora of Iran; Compositae, *Gundelia*, *Gundelia rosea*; new record.

### **Zusammenfassung**

*Gundelia rosea* ist eine gut von *G. tournefortii* zu unterscheidende Art. Sie wird das erste Mal für den Iran nachgewiesen, ihre Merkmale werden dokumentiert und diskutiert.

### **Introduction**

In Flora Iranica the only species *Gundelia tournefortii* is accepted (RECHINGER 1989), *Gundelia rosea* (AL-TAEY & HOSSAIN 1984) being put in synonymy. The genus *Gundelia*, described by LINNÉ (1753), was thought to be monospecific, even infraspecific taxa described by various authors have been ignored. The detailed story of the genus is given by HIND (2013).

Recently new species have been described from Armenia (VITEK et al. 2010, NERSISYAN 2014), from Turkey (VITEK et al. 2014, ARMAĞAN 2016) and from Iran (VITEK & NOROOZI 2017).

*Gundelia rosea* AL-TAEY & HOSSAIN was differentiated from *G. tournefortii* (AL-TAEY & HOSSAIN 1984) based on the differences in the colour of the flower and many other characters, extensively discussed by the authors. In Flora Iranica (RECHINGER 1989) *Gundelia tournefortii* is the only accepted species, and *G. rosea* is given as synonym.

### **Material & Methods**

During the last years photos of *Gundelia* from Iran either sent to the authors or, found from the internet have been analysed. The specimens of *Gundelia* deposited in the herbaria E, G, IRAN, JE, K, TARI, W have been studied. Populations suspected to be different from the hitherto described and accepted species have been visited during field studies in 2015 and 2016. Specimens have been collected, analysed and compared with the type specimens of the relevant taxa. Herbaria are given with their abbreviations in Index Herbariorum (THIERS, continuously updated).

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Fig. 1: *Gundelia rosea*, a) c. 2/3 of one big plant; b) basal (rosette-) leaves (Vitek et al. 15-0131).



Fig. 2: *Gundelia rosea*, a) young synflorescence densely covered with arachnoid hairs, b) flowers, c-d) young fruits (Vitek et al. 15-0131).



Fig. 3: *Gundelia rosea*, a) synflorescence with young fruits, b) synflorescence with elongated bracts (Vitek et al. 15-0131).



Fig. 4: *Gundelia rosea*, a) fruits of the isotype specimen in K (photo Kew Gardens), b) fruits of the Bozgush population (Vitek et al. 15-0134).

## Results

During field studies large populations of a *Gundelia* species with inside pinkish, outside purple pink flowers were found in the Bozgush mountains (Fig. 5). These populations have been visited during field works in 2015. The analyses of the characters showed, that these populations are within the variability of *Gundelia rosea*, though the fruits are slightly smaller (but this can be due to being unripe when collected). When compared with the isotype specimen in K (Fig. 4a) the fruits of the Bozgush have the same shape (Fig. 4b) and the same form of spines, forming a crown-like structure on top of the fruit.

*G. rosea* – having been ignored – is not known sufficiently. Therefore it is presented here.

Characters (terminology follows CLASSEN-BOCKHOFF et al. 1989): Plants perennial, up to 90 (–100) cm, with up to 8 branches, branched again, bearing up to 50 synflorescences (Fig. 1a); the basal leaves are up to 1 m long (Fig. 1b); the young synflorescences are densely covered with arachnoid hairs; the bracts have lateral spines and are normally tinged with purple; in the central part of the synflorescence the partial synflorescence consists of 7–8 flowers [AL-TAEY & HOSSAIN (1984) give 5–8 (–11) including the partial synflorescences on top and at base]; the flowers are pinkish inside and purple pink outside (Fig. 2b); the spines of the (future) fruits are  $\pm$  equal in length at end of anthesis (Fig. 2c–d, 3a); the ripe fruits are conical to obovoid (Fig. 4b); when the fruits are ripe the spines have different length, up to 5 mm long, the spines on the central flowers are slightly longer, they adhere to a crown-like structure, pointing crisscross in all directions. Plants with elongated bracts (Fig. 3b) have been observed less than 1% scattered between normal plants.

Habitat: mountain meadows and stony slopes (Fig. 5), 1500–2550 m a.s.l., slopes from 0 to 30°.

Accompanying species: *Astragalus microcephalus*, *Bromus tomentellus*, *Bromus tectorum*, *Cerastium inflatum*, *Androsace maxima*, *Ceratocephala falcata*, *Cousinia calcephala*, *Lamium amplexicaule*, *Minuartia meyeri*, *Papaver argemone*, *Phlomis olivieri*, *Poa bulbosa*, *Rochelia persica*, *Scariola orientalis*, *Scutellaria pinnatifida*, *Senecio glaucus*, *Thymus kotschyanus*.

Seen specimens: Iran, province Āsārbāyjān-e Sharqi, 32.5 km N Miyaneh, Boz Ghoush mountains, 2.3 km NNW of Sorkeh Hesar, 37°43'06"N 47°40'57"E, 2015-06-11, Vitek, E., Noroozi, J. & Rainer, H. 15-



Fig. 5: *Gundelia rosea*, habitat (Vitek et al. 15-0131).

0131 [W 2015-0008814 + 2015-0008815, B, BM, E, EVIN, G, HSBU, K, MA, MSB, NY, TARI, US]; – province Āsārbāyjān-e Sharqi, road Aghamirloo – Tevin, 1.5 km NE Tevin, 37°45'57"N 48°04'43"E, 2015-06-10, Vitek,E., Noroozi,J. & Rainer,H. 15-0096 [W 2015-0008812 + 2015-0008813, BC, C, H, JE, L, MO, WU]; – province Āsārbāyjān-e Sharqi, 20.5 km NNW Miyaneh, Boz Ghoush mountains, SE of Eshlag, 37°35'35"N 47°37'39"E, 2015-06-11, Vitek,E., Noroozi,J. & Rainer,H. 15-0097 [W 2015-0008572]; – province Āsārbāyjān-e Sharqi, 32.5 km N Miyaneh, Boz Ghoush mountains, 2.3 km NNW of Sorkeh Hesar, 37°43'06"N 47°40'57"E, 2015-06-11, Vitek,E., Noroozi,J. & Rainer,H. 15-0132 [W 2015-0008584, E, M, US]; – province Āsārbāyjān-e Sharqi, 32.5 km N Miyaneh, Boz Ghoush mountains, 2.3 km NNW of Sorkeh Hesar, 37°43'01"N 47°40'55"E, 2015-06-11, Vitek,E., Noroozi,J. & Rainer,H. 15-0133 [W 2015-0008816 + 2015-0008817, G, NY]; – Iran, Mianeh, Eshlagh, 1500 m, 2010-06-09, Noroozi,J. 2109 [W 2011-0005192]; – Iran, Mianeh, Bozgush Mts., above Geshlage Musabay, 2000 m, 2010-05-30 Noroozi,J. 2001 [W 2011-0005189]; – Iran, east Azerbaijan, Mianeh, Bozgush Mts. (above Balesin), 2400-2500 m, 37°41'N, 47°34'E, 2014-06-05, Noroozi,J. 2948 [W 2014-0013578, W 2014-0013579, W 2015-0000541]; – Persia, prov. Azerbaijan orient., in lapidosis 12 km NW Mianeh, 1350 m, 1971-06-05, Rechinger,K.H. 39342 [W 1993-0001914].

Kordestan, between Divandarre and Sanandaj, near Geybisure village, 8 km to Hoseinabad village, 1800-1900 m, 35°37'N 47°08'E, 2014-06-15, Noroozi,J. 3045 [W 2014-0013572, W 2015-0000533 + 2015-0000534, W 2015-0000535]

## Discussion

*Gundelia rosea* is clearly distinguished from *G. tournefortii* (VITEK et al. 2017). There are marked differences in, indumentum, flower colour, fruit size and shape. Previously *G. rosea* was only certainly known from Iraq. Though AL-TAEY & HOSSAIN (1984) suspected the existence of that species also in Iran. There was no further attention to the case, as the species was put into synonymy in Flora Iranica (RECHINGER 1989).

AL-TAEY & HOSSAIN (1984) also mention that they never found an intermediate population even, when the two species grow in close proximity to each other. They suspect a reproductive barrier. There are differences in the flower morphology and pollination within the genus. Flowers open at different times of the day (VITEK et al. 2010), in some species the style breaks immediately through the anther tube and unfolds at the very beginning of anthesis (e.g. *Gundelia tehranica*, VITEK & NOROOZI 2017, fig. 1a), in contrary the style of *G. rosea* in the Bozgush mountains remains unfolded nearly the whole flowering period (Fig. 2b). These characters need checking for consistency throughout the whole population. It could be a hint for different methods of pollination.

The distribution of *G. rosea* is still known insufficiently, as most of the dubious specimens in the herbaria (e.g. from Azerbaidjan, Arak, Kordestan) bear no information on flower colour and the specimens are often insufficient for determination.

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