

## *Inula rajamandii* (Asteraceae), a new species from Iran

Sara Narimisa & Farrokh Ghahremaninejad

Department of Biology, Faculty of Science, Tarbiat Moallem University, No. 49 Dr. Mofatteh Avenue, Tehran 15614, Iran

Received 30 May 2008, revised version received 12 June 2009, accepted 29 Aug. 2008

Narimisa, S. & Ghahremaninejad, F. 2009: *Inula rajamandii* (Asteraceae), a new species from Iran. — *Ann. Bot. Fennici* 46: 585–587.

*Inula rajamandii* Narimisa & F. Ghahremani. *sp. nova* (Asteraceae, Inuleae) from NW Iran is described and illustrated. It is endemic to the Azarbayjan province. The species appears to be most closely related to *Inula viscidula*, with which it is compared.

Key words: *Inula*, Asteraceae, Inuleae, new species, taxonomy

The genus *Inula* belongs to tribe Inuleae of the family Asteraceae and has about 100 species (Anderberg 1991). These plants grow as perennial and annual herbs in different parts of Iran, being most frequent in the northern part of the country. According to Georgiadou *et al.* (1980) and the recent study by Ghahremaninejad and Narimisa (2005), there are 15 species of *Inula* in Iran. Here, a new species of *Inula* is described from Iran. The specimens were checked against floras of the neighboring countries (Gorshkova 1990, Davis 1975).

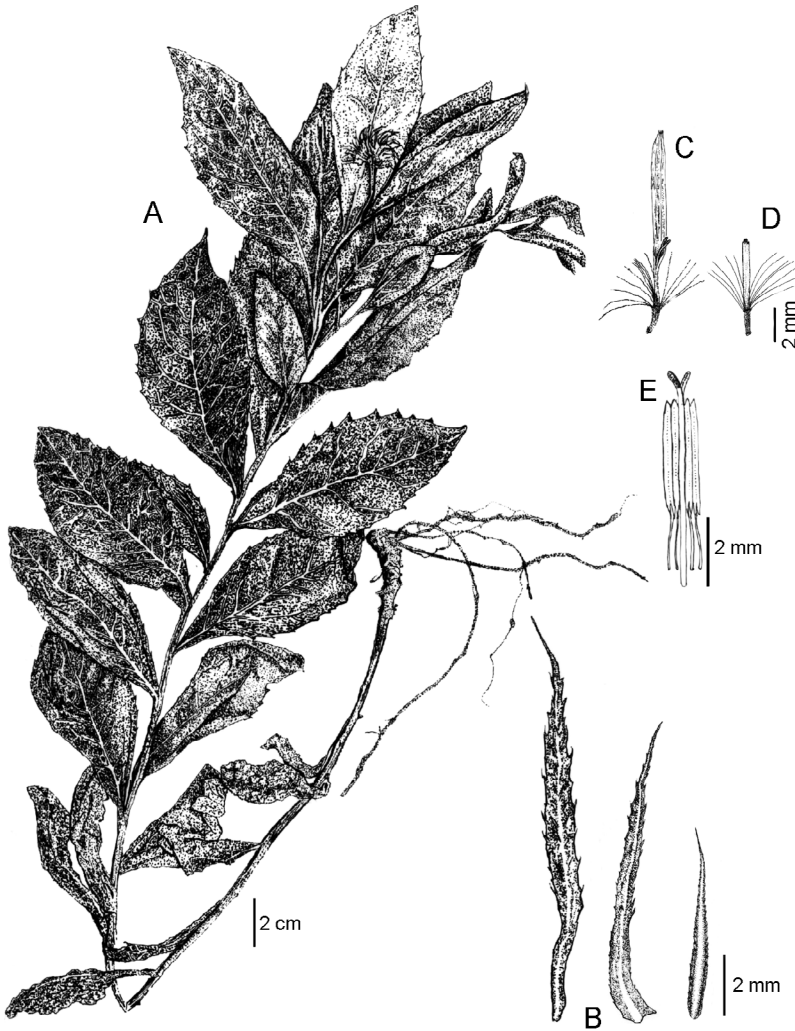
***Inula rajamandii* Narimisa & F. Ghahremani., *sp. nova* (Fig. 1)**

*Inulae viscidulae* Boiss. & Kotschy *affinis*, *sed foliis lineari-lanceolatis (nec lanceolatis), circa pappis 17 (nec 25–30), 3.5 mm (nec 5–7.5 mm) longis, acheniis pilosis (nec sparse pilosis vel glabris)*.

TYPE: Iran. West Azarbayjan province, Urmia, Targevar, in valle Pesanchai versus fines Turcicus, 1520–1600 m, 31.VIII.1976 *Kuhafkan, Zehzad & Rogers 7768* (holotype in Herbarium of Urmieh University; isotype FAR).

ETYMOLOGY. The specific epithet honors of Dr. Mohammad-Ali Rajamand, professor of plant taxonomy at Urmieh University, Urmia, Iran.

Rhizomes perennial, glabrous. Stem up to 60 cm tall, green and reddish, erect, with one or two branches in upper part, finely pubescent and glandular in upper part. Leaves serrate, acute, ovate, sessile, cuneate, fragile, withered in lower part, 8.5–9.5 cm long, 4–4.5 cm wide, above scattered pubescent and glandular, beneath pubescent especially on veins, covered with glands. Capitula semiglobular, with one to three heads. Involucre 1.2–1.8 cm in diameter, phyllaries 5 series, ciliate; external ones covered with loose hairs, linear-lanceolate, attenuate, outspread, glandular, herbaceous, cartilaginous at base, 7.2–12.5 mm long, 1.5–5 mm wide, others ciliate-glandular; middle rows 11–12 mm long, 0.5–0.4 mm wide, acuminate, linear; internals 6–6.5 mm long, 0.4–0.5 mm wide, cartilaginous. Ray flowers 10–11 mm long, glabrous, 3-denticulate; disc flowers 4–4.2 mm long, covered with glands in upper part. Pistil 3 mm long, stigma 1 mm long. Anthers 2–2.5 mm long; filaments ca. 1 mm long. Achenes ca. 1 mm long, covered with hairs. Pappus 3.5 mm long, ca.



**Fig. 1.** *Inula rajamandii* (from the holotype). — **A:** Habit. — **B:** Phyllaries (outer–inner). — **C:** Ray flower. — **D:** Tubular flower. — **E:** Anthers, stigma, pistil.

17-bristled, pale yellow, free at the base. Flowering and fruiting in July–September.

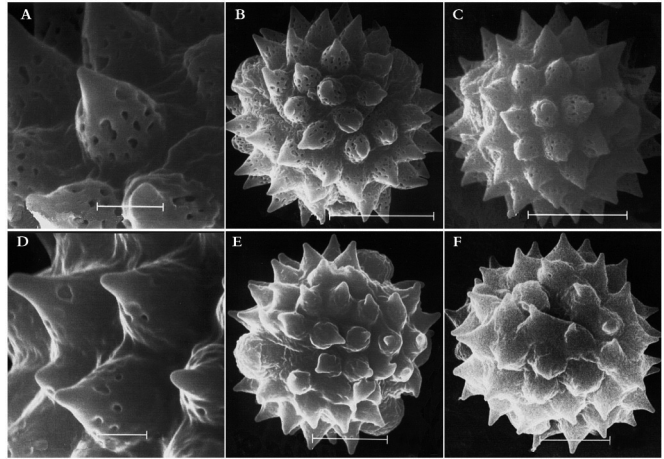
*Inula rajamandii* is endemic to Iran and known only from the type specimens, which were collected in a mountainous area around Urmia in West Azarbayjan province, Iran. It is closely similar to *I. viscidula*, distributed in W and E Azarbayjan, plus Kordestan and Lorestan provinces of Iran, but can be distinguished by several characters (Table 1).

The pollen of *I. rajamandii* and *I. viscidula* were studied by light microscope (LM) and scanning electron microscope (SEM). Pollen grains were prepared according to Erdtman (1960) and the measurements were made with Zeiss stand-

ard 20 microscope. Measurements of grains were based on ca. 30 grains per sample. For SEM study, the pollen grains were coated with gold and examined with a Philips XL30 SEM. There are differences also in the pollen grains of the two species (Fig. 2 and Table 2).

### Acknowledgements

We thank the director of the Herbarium of Urmieh University for the opportunity to study the *Inula* specimens. We would like to thank Dr. Philip Oswald (Cambridge, UK) for the Latin diagnosis. Thanks are also due to Soheila Narimisa for preparing the illustration.



**Fig. 2.** SEM micrographs of pollen grains. — **A–C:** *Inula rajamandii* (from the holotype). — **A:** Exine pattern. — **B:** Polar view. — **C:** Equatorial view. — **D–F:** *Inula viscidula* (from Ghahremani 2375). — **D:** Exine pattern. — **E:** Polar view. — **F:** Equatorial view. Scale bars: **B, C, E, F** = 10  $\mu\text{m}$ ; **A, D** = 2  $\mu\text{m}$

**Table 1.** Morphological comparison of *Inula rajamandii* and *I. viscidula*.

Characters	<i>I. rajamandii</i>	<i>I. viscidula</i>
Height	60 cm	30–50 cm
Length of middle leaves	8.5–9.5 cm	5–5.5 cm
Capitulum diameter	1.2–1.8 cm	1.5–3.3 cm
External phyllaries	linear-lanceolate	lanceolate
Ligular floret length	10–11 mm	9–12 mm
Tubular floret length	4–4.2 mm	5–8 mm
Achene length	1 mm	1.5–2 mm
Achene indumentum	hirsute	sparsely hirsute to glabrous
Pappus number	17	25–30

**Table 2.** *Inula rajamandii* and *I. viscidula* minimum, (average) and maximum pollen grain dimensions. Polar area index or PAI (= apocolpium index) is the ratio of the distance between the apices of two ectocolpi of a zonocolpate pollen grain to its equatorial diameter. *P/E* ratio is the ratio of the length of the polar axis (*P*) to the equatorial diameter (*E*). The measurements are based on ca. 30 readings from each specimen.

	Spine distance ( $\mu\text{m}$ )	Spine length ( $\mu\text{m}$ )	Apocolpium ( $\mu\text{m}$ )	Equatorial diameter ( $\mu\text{m}$ )	Polar length ( $\mu\text{m}$ )	Polar area index	<i>P/E</i> ratio
<i>I. rajamandii</i>	3.45(5.02)6	3.16(3.95)4.8	8(10.22)13	21(24.12)27	21(24)29	0.42	0.99
<i>I. viscidula</i>	4.09(5.83)7.91	3.59(4.42)5.36	10(12.2)16	24(27.36)30	24(28)35	0.44	1.02

## References

- Anderberg, A. 1991: Taxonomy and phylogeny of the tribe Inuleae (Asteraceae). — *Pl. Syst. Evol.* 176: 75–123.
- Davis, P. H. (ed.) 1975: *Flora of Turkey and the East Aegean Islands*, vol. 5. — Univ. Press, Edinburgh.
- Erdtman, G. 1960: The acetolysis method: revised description. — *Svensk. Bot. Tidskr.* 54: 561–564.
- Georgiadou, E., Lack, H. W., Merxmuller, H., Rechinger, K. H. & Wagenitz, G. 1980: Compositae IV: *Inula* L. — In: Rechinger, K. H. (ed.), *Flora Iranica* 145: 77–96. Akad. Druck- u. Verlagsanst., Graz.
- Ghahremaninejad, F. & Narimisa, S. 2005: *Inula persica* (Asteraceae: Inuleae), a new species from Kerman province, Iran. — *Ann. Bot. Fennici* 42: 211–231.
- Gorshkova, S. G. 1990: *Inula* L. — In: Komarov, V. L. & Shishkin, B. K. (eds.), *Flora of the USSR*, vol. 25: 464–513. Bishen Singh Mahendra Pal Singh & Koeltz Sci. Books, Dehra Dun.