



***Centaurea regia* subsp. *javanroudense*, a new subspecies of *Centaurea* sect. *Cynaroides* (Asteraceae), from flora of Iran**

Massoud RANJBAR ^{*1}, Kazem NEGARESH ¹, Roya KARAMIAN ¹

¹Department of Biology, Herbarium division, Bu-Ali Sina University, P. O. Box 65175/4161, Hamedan, Iran

Abstract

Centaurea regia Boiss. subsp. *javanroudense* Ranjbar & Negareh (Asteraceae) is described and illustrated from Zagros mountain in W Iran as a new taxon. It is a distinct species among the other Iranian species belonging to *Centaurea* sect. *Cynaroides*, which contains plants have often capitula solitary or synflorescences racemose, upper stem leaf decurrent, involucre subglobose with pink or yellow flowers. The new taxon is closely related to *C. regia* Boiss., but differs by its stem indumentums (hirsute articulate vs. arachnoid tomentose), median stem leaf shape (oblong or elliptic vs. broadly lanceolate or oblong), and outer appendage shape (broadly cordate vs. ovate).

Key words: *Cynaroides*, *Centaurea regia* subsp. *javanrousense*, Iran

1. Introduction

Centaurea L. s.l. is one of the largest genera of the family Asteraceae. It is a taxonomically difficult genus and depending on the classification adopted comprises between 400 and 700 species (Boissier, 1875; Wagenitz, 1975; Dittrich, 1977; Bremer, 1994; Wagenitz and Hellwig, 1996). The taxonomic complexity of *Centaurea*, especially in the Near East, has stimulated in much recent research (Wagenitz, 1983; Kaya, 1986; Kaya, 1987; Hellwig, 1994; Kaya et al., 1996; Wagenitz and Hellwig, 1997; Wagenitz et al., 1998; Türkoglu et al., 2003). Cytological data, in particular, which are still inadequate for the *Centaurea* species of the Near East, should be considered to resolve taxonomic limits. Because of *Centaurea* s.l. is considered as a taxonomically unnatural group, recent approaches have separated this taxon into more natural genera, namely *Centaurea* s. str., *Cyanus* Mill., *Psephellus* Cass. and *Rhaponticoides* Vaill. (Wagenitz and Hellwig, 2000; Greuter, 2003a, 2003b). It is mainly distributed in Europe, Mediterranean region, and SW Asia, with introductions in other more or less distant region. It is also one of the largest genera of the family Asteraceae in Iran. In Flora Iranica, the genus is represented by 70 species in Iran, of which 32 are endemic (Wagenitz, 1980). Recently, 3 species and 2 records have been added to the genus in Iran (Mozaffarian, 1991; Mozaffarian, 1992; Mozaffarian, 2006; Mozaffarian, 2010; Ghahreman and Attar, 2000).

2. Materials and methods

During our field excursions in Iran, we collected some specimens belonging to the genus *Centaurea* and also the closely related genera from Taze Abad around Kermanshah Province, W Iran both in flowering and fruiting phases, from 2007 to 2011. In addition, several sheets were examined from the herbaria BASU, B, G and W. The collected *Centaurea* specimens were identified according to the Flora Iranica (Wagenitz, 1980). Two populations of a taxon that showed some important morphological differences with *C. regia* are described and illustrated as a new taxon from W Iran.

* Corresponding author / Haberleşmeden sorumlu yazar: Tel.: 0098-811-8271541; Fax.: 0098-811-8381172; E-mail: ranjbar@basu.ac.ir

3. Results and discussion

3. 1. Description of new subspecies

Centaurea regia* subsp. *javanroudense Ranjbar & Negaresh, subsp. nova. (Figure 1)

Differt ab *Centaurea regia* Boiss. Caulis in parte inferiore articulatis loose hirsutus (nec arachano-tomentosa), folia caulina media oblonga vel elliptica (nec late lanceolata vel oblonga), appendices exteriores late cordato, decurrentia, (nec ovato, non decurrentia), ciliis utrinque 4 – 22 (nec 10 – 17), Achaenia 5.7 – 6 mm (nec ad 9 mm) longa distinguitur.

Type: Iran, Prov. Kermanshah, Javanroud to Taze Abad, 1350 m, 7. 5. 2008, Ranjbar & Negaresh 16105 (BASU)

Biennial with thick fleshy taproot, remains of stems and leaf bases of the previous year present. Stem erect, often branched from median or upper part, striate, up to 60 cm tall, above part glabrescent, below covered with loosely hirsute-articulate hairs, up to 2 mm long, somewhat heteromorphic in length, and glandular hairs. Leaves rigid, papery (on drying), covered with loosely hirsute-articulate hairs, densely on veins, and glandular hairs, margin scabrous. Basal leaves unknown. Lower stem leaves simple, broadly lanceolate, 21.8 – 23.5 × 7.7 – 8.5 cm, acute at the apex, entire, rarely slightly dentate, petiole up to 12.5 cm long. Median stem leaves sessile, oblong, or elliptic, 14.4 – 17.2 × 6.3 – 7.3 cm, acute at the apex, entire, decurrent, up to 40 mm long. Upper stem leaves increasingly smaller, sessile, lanceolate, oblong, 1.7 – 10.6 × 0.25 – 5 cm, acuminate at the apex, sometimes mucronate, entire, narrowly decurrent, some of the leaves not decurrent. Capitula on each branch solitary, peduncles up to 16 cm long, sometimes with bracts similar to phyllaries (with large appendages). Involucres subglobose, 38 – 50 × 47 – 60 mm. Phyllaries multiseriate, grayish, imbricate, coriaceous-scarious, pubescent. Outer phyllaries ovate, 3 – 4 × 3.5 – 6.5 mm; appendage broadly cordate, 6.3 – 11 × 10.5 – 19 mm (included cilia and spines), white or straw-coloured to brownish, moderately imbricate, decurrent. Median phyllaries broadly oblong, 6.2 – 12.2 × 7.5 – 10 mm; appendage broadly ovate to ovate, 13 – 17 × 22 – 24 mm (included cilia and spines), brownish, or purple, moderately imbricate, not decurrent. Inner phyllaries oblong to narrowly oblong, 17.2 – 30 × 5 – 10 mm; appendage triangular, 6.6 – 14.2 × 4.5 – 17.2 mm (included cilia and spines), brownish, or purple, not decurrent. Appendages totally concealing basal part of phyllaries, chartaceous, some of the appendages are striate brown; cilia white or straw-colored to brownish, narrowly triangular, numerous, 4 – 22 on each side, 1 – 7.5 mm long, slightly scabrous; spines narrowly triangular, 1.8 – 8 (-10) mm long, slightly longer than the closet cilia or ± equal. Flowers pink lilac, central florets hermaphroditic, ca. 51 mm long, 5 lobed, lobes 9 mm long; peripheral florets staminodes, slightly radiant, ca. 45 mm long, 5 lobed, limb lobe narrowly lanceolate to linear, lobes 12.5 – 13 mm long. Achenes ovate, 5.7 – 6 mm long, 2.9 – 3.1 mm wide, smooth and shiny, yellow, rounded at the apex, glabrescent, hilum up to 0.8 mm long. Pappus persistent, double, plumose, white; outer pappus multiseriate, 10 – 10.7 mm long; inner pappus shorter, 2.2 – 3.3 mm long.

3. 2. Key of subspecies of *C. regia*:

- 1a - Stem indumentums hirsute-articulate; median stem leaves oblong or elliptic; outer appendage broadly cordate and decurrent..... subsp. *javanroudense*
- 1b - Stem indumentums arachnoid-tomentose; median stem leaves broadly lanceolate or oblong; outer appendage ovate and not decurrent.....2
- 2a - Terminal spine of median phyllaries (8-) 9 – 14 mm long; median appendage white or straw-coloured rarely brownish..... subsp. *regia*
- 2b - Terminal spine of median phyllaries (3-) 4 – 8 mm long; median appendage brownish.....subsp. *cynarocephala*

3. 3. Examined specimens

Known only from the type material.

3. 4. Etymology

The specific epithet refers to Javanroud in Kermanshah Province, where the new taxon is found.

3. 5. Taxonomic remarks, ecology and distribution

C.entaurea regia Boiss. subsp. *javanroudense* is a rare endemic to W Iran and known only from the dry-steppe zone of the submountainous regions around Tazeh Abad in Kermanshah Province (Figure 2). It may still grow in on clay soils, at 1200 – 1350 m elevations. *C. regia* subsp. *javanroudense* is closely related to *C. regia* Boiss. (Aslan et al., 2011) especially because of similar shape of the habit, size and number of capitule (Figure 3). However, the new taxon differs from it by having some characters (Table 1 and figure 4) such as stem indumentums (vs. arachnoid-tomentose), median stem leaves oblong or elliptic (vs. broadly lanceolate or oblong), outer appendage broadly cordate and decurrent (vs. ovate and not decurrent), inner appendage brownish or purple (vs. brownish), cilia number on each side 4 – 22 (vs. 10 – 17), achenes 5.7 – 6 mm long (vs. up to 9 mm).

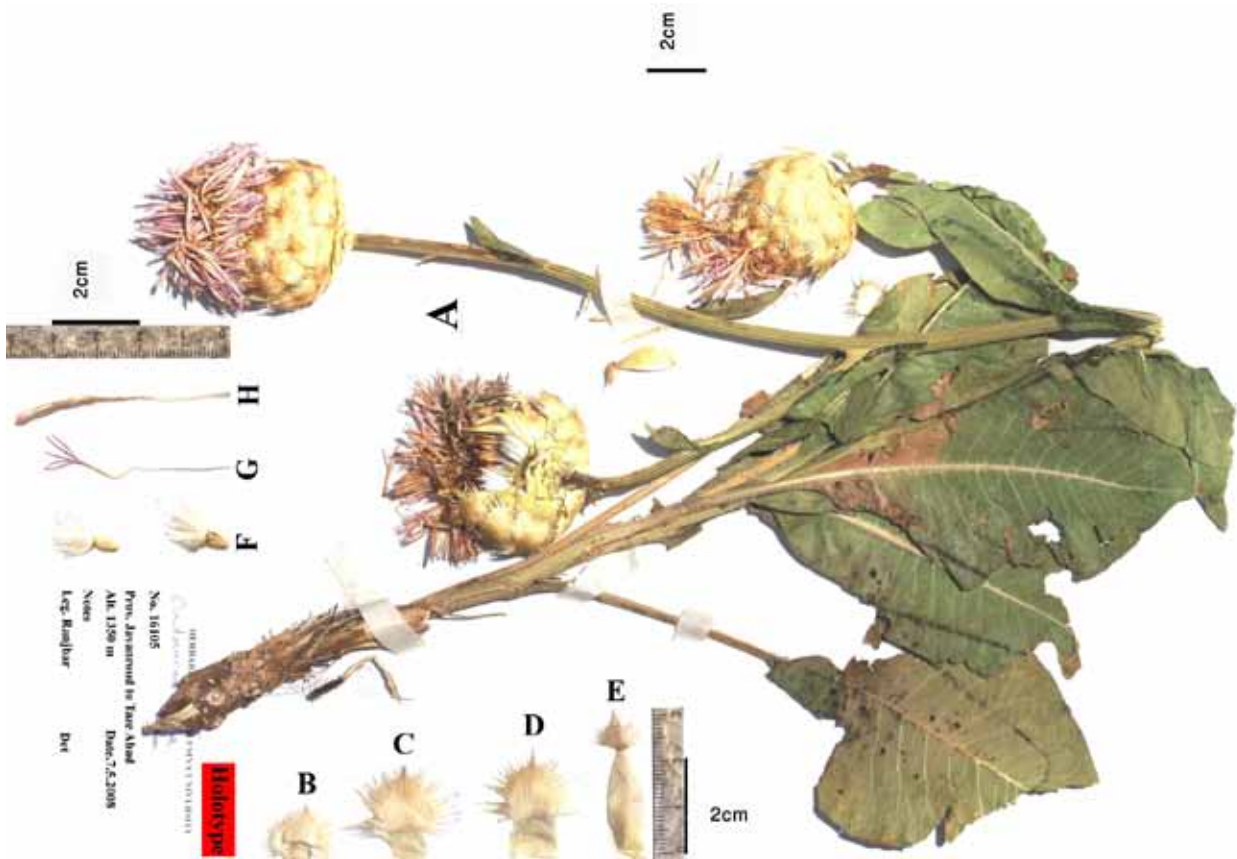


Figure 1. *C.entaurea regia* Boiss. subsp. *javanroudanse*. (A) habit, (B) outer phyllary with decurrent, (C-D) median phyllaries, (E) inner phyllary, (F) achenes with pappus, (G) peripheral floret, (H) central floret, scale bar: A = 2 cm; drawn after the type collection; photograph provided by Ranjbar & Negaresh

Table 1. Diagnostic morphological characters of subsp. *javanroudanse*, subsp. *regia* and subsp. *cynarocephala*

	<u>subsp. javanroudanse</u>	<u>subsp. Regia</u>	<u>subsp. cynarocephala</u>
Stem indumentums	hirsute-articulate	arachnoid-tomentose	arachnoid-tomentose
Median stem leaf shape	oblong or elliptic	broadly lanceolate or oblong	broadly lanceolate or oblong
Outer appendage shape	broadly cordate	ovate	ovate
Median appendage colour	brownish or purple	white or straw-coloured rarely brownish	brownish
Cilia number on each side	4 – 22	10 – 17	10 – 17
Median phyllary spine length (mm)	3 – 6	(8) 9 – 14	(3) 4 – 8

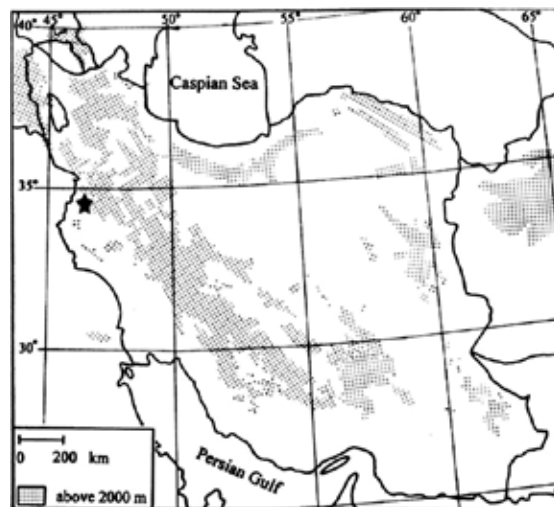


Figure 2. Distribution of *C.entaurea regia* Boiss. subsp. *javanroudanse* in Iran



Figure 3. *Centaurea regia* (Kotschy 371); photograph provided by the G

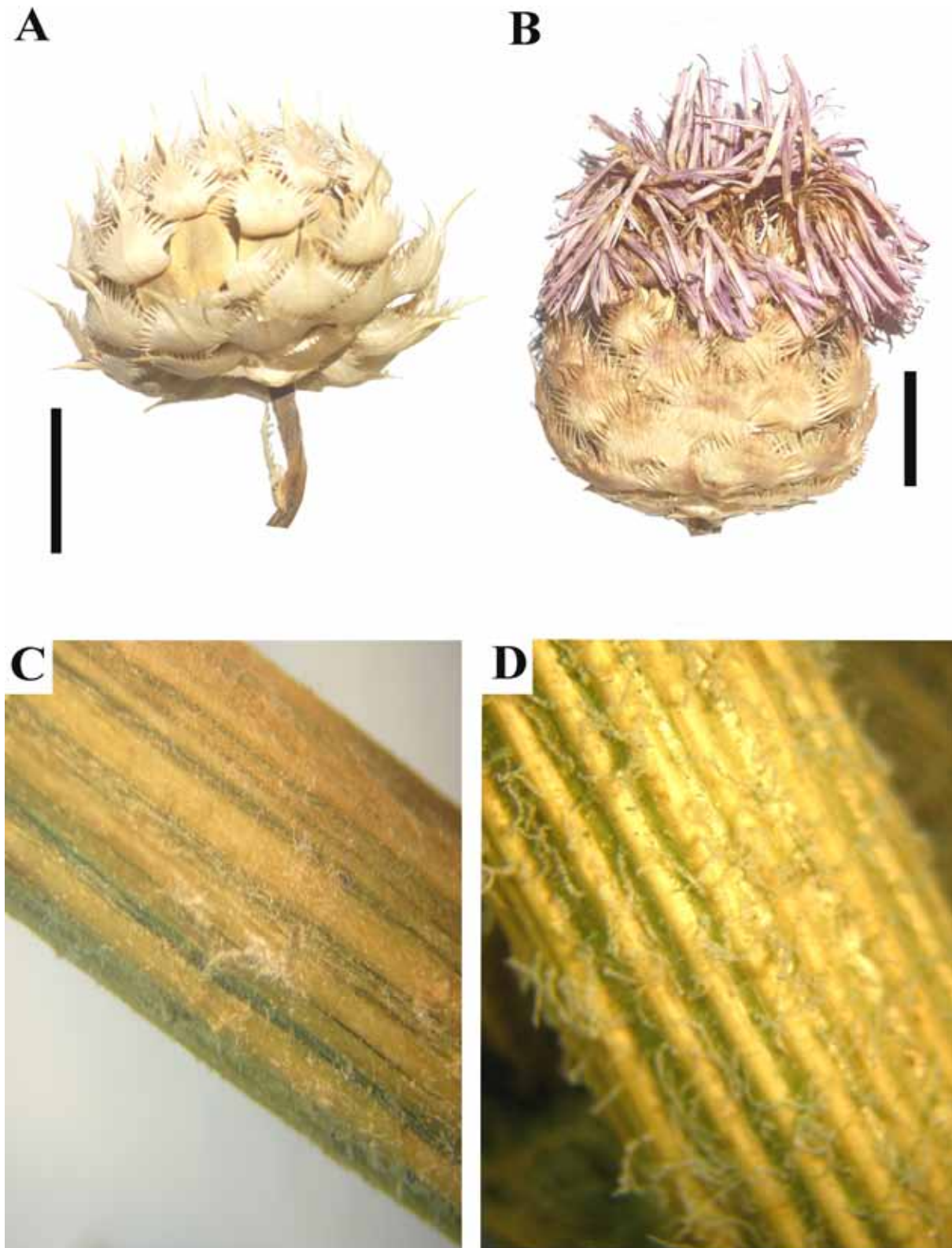


Figure 4. (A) close up of capitule of *C. regia*, (B) close up of capitule of *C. regia* subsp. *javanroudanse*, (C) indumentums of stem of *C. regia*, (D) indumentums of stem of *C. regia* subsp. *javanroudanse*. (A-B) Scale bar = 2 cm).

Acknowledgements

The great help of Dr. Vitek, Dr. Wallofer, Dr. Till, Dr. Gautier and Mr. Fumeaux during our visit to the herbaria W and WU in Vienna and G in Geneve is much appreciated. This research received financial support from the Bu-Ali Sina University.

References

- Aslan, S., Vural, M., Sahin, B., Celik, S., Karaveliogullari, F. A. 2011. Presence of *Centaurea regia* Boiss. subsp. *regia* (subgenus *Cynaroides* (Boiss. ex Walp) Dostal, Compositae) in Turkey, *Biological Diversity and Conservation* 3: 185 – 191.
- Boissier, E. 1875. *Flora Orientalis*, Vol. 3, A. Asher & Co. 1963 (reprint), Geneve.
- Bremer, K. 1994. *Asteraceae: Cladistics and Classification*. Timber Press, Portland.
- Dittrich, M. 1977. Cynareae-systematic review. In: Heywood, V. H., Harborne, J. B., Turner, B. L. (eds.), *The Biology and Chemistry of Compositae*. pp. 999 – 1015. Oriole, New York,
- Duran, A., Ozturk, M., Dogan, B. 2009. A new species of the genus *Psephellus* (Asteraceae) from North-East Anatolia, Turkey, *Ozean Journal of Applied Science*, 2 (1): 103 – 111.
- Ghahreman, A., Attar, F. 2000. New reports of three endangered species of *Centaurea* (Sect. *Cynaroideae*, Asteraceae) from Iran, *Irannian Journal of Botany*, 8 (2): 209 – 302.
- Greuter, W. 2003a. The Euro+Med treatment of Cardueae (Compositae) – generic concepts and required new names. *Willdenowia*, 33: 49 – 61.
- Greuter, W. 2003b. The Euro+Med treatment Senecioneae and the minor Compositae tribes-generic concepts and required new names, with an addendum to Cardueae. *Willdenowia*, 33: 245 – 250.
- Hellwig, F. H. 1994. Chromosomenzahlen aus der tribu Cardueae (Compositae). *Willdenowia*, 24: 219 – 248.
- Kaya, Z. 1986. Exterior and interior morphological studies on the Turkish endemic *C. derderiifolia* Wagenitz and *C. saligna* (C. Koch) Wagenitz. *Journal Pharmaceutical University Marmara*, 2 (2): 145 – 156.
- Kaya, Z. 1987. Exterior and interior morphological studies on the Turkish endemic *C. derderiifolia* Wagenitz and *C. saligna* (C. Koch) Wagenitz 2. *Journal Pharmaceutical University Marmara*, 3 (1): 1 – 17.
- Kaya, Z., Sezer, N., Kuş, S., Tutel, B. 1996. Systematic and palynological research on some endemic species of *Centaurea* in Turkey. In: *Plant life in Southwest and Central Asia 2*. Ege. University Press İzmir, Türkiye pp. 850 – 870.
- Mozaffarian, V. 1991. New species and new plant records from Iran, *Irannian Journal of Botany*, 5 (1): 29 – 39.
- Mozaffarian, V. 1992. New species and interesting plant records from Iran, *Irannian Journal of Botany*, 5 (2): 83 – 90.
- Mozaffarian, V. 2006. Studies on the flora of Iran, four new species and a short note on an interesting Rubiaceae, *Irannian Journal of Botany*, 16 (2): 107 – 113.
- Mozaffarian, V. 2010. Three new species and two species records from Iran, Ilam Province, *Irannian Journal of Botany*, 16 (2): 204 – 212.
- Susanna, A., Gracia-Jaces, N. 2007. Tribe Cardueae. In: Kardereit, J. W. and Jefery, C. (eds.), *The families and genera of vascular plants*, Spinger Verlag, Berlin, Heidelberg & New York, 123 – 127.
- Turkoglu, I., Akan, H., Civelek, S. 2003. A new species *Centaurea* (Asteraceae: sect. *Psephelloideae*) from Turkey, *Botanical Journal of the Linnaean Society*, 143: 207 – 212.
- Uysal, T. 2008. *Centaurea ertugruliana* (Asteraceae), a new species from Turkey, *Annales of Botanici Fennici*, 45: 137 – 140.
- Wagenitz, G. 1975. *Centaurea* L. In: Davis, P. H. (ed.). *Flora of Turkey and the East Aegean Islands*. Vol. 5, 465 – ...585, Edinbrugh, Edinbrugh University Press.
- Wagenitz, G. 1980. *Centaurea* L.. In: Rechinger, K. H. (ed.), *Flora Iranica*. Vol. 139b, 313 – 420. Akademische Druk, Verlagsanstalt, Graz.
- Wagenitz, G. 1983. *Centaurea* and Index Kewensis. *Taxon*, 32: 107 – 109.
- Wagenitz, G., Hellwig, F. H. 1996. Evolution of characters and phylogeny of the Centaureinae. In: Hind, D. J. N., Beentje, H. J. (eds.), *Compositae: Systematics*. Proceedings of the International Compositae Conference, Kew, 1994, 1.
- Wagenitz, G., Ertuğrul, K., Dural, H. 1998. A new species of *Centaurea* sect. *Psephelloideae* (Compositae) from SW Turkey. *Willdenowia*, 28: 157 – 161.
- Wagenitz, G., Hellwig, F. H. 2000. The genus *Psephellus* Cass. (Compositae, Cardueae) revisited with a broadened concept, *Willdenowia*, 30: 29 – 44.

Received for publication 26 December 2011; The date of publication 15 April 2012)