

A TAXONOMIC REVISION OF THE GENUS *VULPIA* C. C. GMEL. (POACEAE, POEAE) IN IRAN

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As a result of a taxonomic review of the Iranian materials of the genus *Vulpia* and the relevant literature this genus was recognized as possessing five species and four subspecies occurring in Iran. The novelties of this study for the flora of Iran are: describing one new taxon: *V. unilateralis* subsp. *tomentosa*; reporting one new record for the flora of Iran: *V. ciliata* subsp. *plumosa*; and literature correction of *V. ciliata* Dumort. and accepting the correct Name "*Vulpia unilateralis* (L.) Stace" for "*Nrdurus maritimus* (L.) Murb." for the floor of Iran.

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Key words. *Vulpia*, Poaceae, taxonomy, revision, new taxa, Iran.

بازنگری تاکسونومی جنس *Vulpia* (Poaceae, Poeae) در ایران

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بر مبنای بازبینی تاکسونومیک جنس *Vulpia* و منابع مربوط آن در ایران این جنس با پنج گونه و چهار زیرگونه در ایران به رسمیت شناخته می‌شود. نوآوری این مطالعه برای فلور ایران شامل موارد زیر است: معرفی یک تاکسون جدید: *V. unilateralis* subsp. *tomentosa*. معرفی یک گزارش جدید برای ایران: *V. ciliata* subsp. *plumosa* و اصلاح نام‌گذاری *V. ciliata* Dumort. و پذیرش موقعیت تاکسونومیک اصلاح شده‌ی گونه‌ی *Nrdurus maritimus* (L.) Murb. به *Vulpia unilateralis* (L.) Stace بر ای فلور ایران.

Introduction

The genus *Vulpia* was established as a monotypic taxon by Gmelin (1805) and has been the matter of great controversies both taxonomically and on literature points of view (Ledebour, 1853; Boissier, 1884; Post, 1896; Krechetovich and Bobrov, 1934; Parsa, 1950; Guinochet and Faurel, 1955; Bor, 1968 and 1970; Stace and Cotton 1980; Nasir and Ali, 1982; Tsvelev, 1983; Stace, 1985; Lu and Phillips, 2006). Boissier (1884) in his account for the genus recognized *V. myuros* auct. L. and *V. ciliata* Pers. growing in Iran, afterward the number of species in this country was increased to 3 (*V. myuros* (L.) Gmelin, *V. ciliata* (Danthon) Link and *V. hirtiglumis* Boiss. and Hausskn.) by Parsa (1950). Bor (1970) subdividing the genus into two sections added two more species i. e., *V. persica* (Boiss. & Buhse) V. Krecz. & Bobrov in Komarv. and *V. megalura* (Nutt.) Rydb. to Parsa's list from which the

latter is of doubtful distribution in Iran (Bor 1970). This study aimed to review the taxonomic status of the genus *Vulpia* in Iran.

Materials and methods

In this study, 82 specimens specifically collected all around Iran for this investigation were taxonomically examined and their vouchers are deposited in the Herbarium of the University of Isfahan, in addition TARI's *Vulpia* collection was also included in this study. Identifications were mainly based on Bor (1970). For taxonomic evaluations, the spikelet's diagnostic features mainly derived from original publications were examined among the materials studied.

Results

The observations of this study showed that the genus *Vulpia* occurs with a total of 7 taxa including 5 species

and 4 subspecies in Iran. This study showed that the best applicable discriminating characters for *Vulpia* taxa in Iran were that of the indumentums of lemmas. This structure showed a wide range of variability from glabrous, scabrous, ciliate (only in the upper part along margins), long-hairs along margins and often along the midrib to scabrous almost all over the surface due to very short spinules. However, lemmas features differed widely as: lanceolate, elliptic and ovate in shape and membranous, chartaceous, or coriaceous in texture. Lemmas always showed a long pointed apex but it cannot be accounted for an awn. Despite the high morphological variability of glumes, only its size is of diagnostic value in separating *V. myuros* from *V. persica*.

This study showed that the number of florets in each spikelet varies from 3 to 7 from which 0 (only in *V. unilateralis*) to 4 florets were sterile.

Taxonomic discussion and conclusion

1. *Vulpia myuros* (L.) C. C. Gmel., in: Fl. Bad. 1: 8 (1805), Fig. 1.

Syn.: *Festuca myuros* L., Sp. Pl. 74 (1753); *Festuca megalura* Nutt., J. Acad. Nat. Sci. Philadelphia, 2 (1): 188 (1847); *Vulpia megalura* (Nutt.) Rydb., Bull. Torrey Bot. Club 36: 538 (1909).

V. megalura differs briefly from *V. myuros* in possessing ciliate lemmas along margins in the upper parts of the uppermost florets and glabrous lemmas in the lowermost florets, while in the latter species lemmas are mostly glabrous or rarely either scabrous only along the margins and midrib or in the upper parts. Cotton and Stace (1976) treated *V. megalura* as an infra-specific taxon (form) in *V. myuros*, a decision that was followed by Auquier (1977) who regarding the former species as a variety and Soják (1980) that treated as a subsp. in the latter. Regarding the lack of very sharp and prominent features between these two taxa, *V. megalura* was considered as a synonym of *V. myuros*.

2. *Vulpia persica* (Boiss. & Buhse) Krecz. & Bobr. in Komar., Fl. URSS. 2: 535 (1934), Fig. 2.

Syn.: *Nardurus persicus* Boiss. & Buhse, Nouv. Mém. Soc. Nat. Mosc. 12: 225 (1860).

3. *V. ciliata* Dumort, Obs. Gram. Belg. 100 (1824), Fig. 3.

Syn.: *Festuca ciliata* Danthoine ex Lam. & DC., Fl. Franc. 3 (3): 55 (1805) non Guan, Hortus Monspelinsis: 48 (1762) nec Link, Schrad. Journ. ii. (1799) 315 nec *V. ciliata* Link, Hort. Reg. Bot. Berol. 1: 147 (1827).

This species is mentioned in *Flora Iranica* (Bor

1970) as: *V. ciliata* Link. Based on the results of this study this species is recognized with two subspecies for the flora of Iran.

- subsp. *ciliata*

Syn.: *Festuca myuros* var. *ciliata* (Danthoine ex Lam. & DC.) Coss. and Dur., Expl. Sc. Alg. p. 172 (1805); *Vulpia myuros* var. *ciliata* (Danthoine ex Lam. & DC.) B. and B., Cat. Tun. p. 480 (1896).

- subsp. *plumosa* Boiss., Fl. Or. 5: 629 (1884), Fig. 3.

4. *Vulpia hirtiglumis* Boiss. & Hausskn., Boiss., Fl. Or. 5: 629 (1884), Fig. 4.

5. *Vulpia unilateralis* (L.) Stace, Bot. Jour. Linn. Soc. 76: 350 (1978), Fig. 5.

Syn.: *Festuca maritima* L., Sp. Pl. 1: 75 (1753) non *Vulpia maritima* Grey; *Triticum unilaterale* L., Mant. Pl. 35 (1767); *Nardurus unilateralis* (L.) Boiss., Pugill. Pl. Afr. Bor. Hispan. 130 (1852); *Nardurus unilateralis* (L.) Fries. in Fourn., Bull. Soc. Bot. Fr. 13: 131 (1866); *Nardurus maritimus* (L.) Murb., Contrib. Fl. Nord-Ouest Afr. & Tunis. iv. (Acta Reg. Soc. Physiogr. Lund, xi.) 25 (1900).

As Stace (1978) argued well, the genus *Nardurus* was established by Reichenbach (1830) based on a small grass which previously was treated differently in *Brachypodium*, *Festuca* and *Triticum* (*Nardurus tenellus* = *Festuca maritima*). He (Stace, 1978) in a synonymy regarding the concepts corresponding to *Nardurus*, made it a section under *Vulpia* and for the basionym *Triticum unilaterale* known *Vulpia unilateralis* (L.) Stace. While *Festuca maritima* and *Triticum unilaterale* were both described by Linnaeus in 1753 and 1767 and he, himself considered the former as a synonym for the latter (Linnaeus, 1767) however using this species epithet (*Vulpia maritima*) by Gray (1821) prevents the priority of *Festuca maritima* against *Triticum unilaterale*.

The main reason separating the genera *Vulpia* and *Nardurus* is related to their inflorescence type, which is a panicle particularly at base in the former, while a raceme is mainly mentioned for the latter (Stace and Cotton, 1980; Tsvelev, 1983; Stace, 1985). Examining many specimens in this study showed that in so called *Nardurus maritimus* the second spike like (as mentioned by Stace 1985) inflorescence is in fact a panicle at base and raceme with very short spikelet pedicels (0.5 – 1.5 mm) for the rest. Therefore, the incorporation of *Nardurus maritimus* into *Vulpia*, as done by Stace (1978) was accepted.

-subsp. *unilateralis*

- *Vulpia unilateralis* subsp. *tomentosa* Faramarzi &

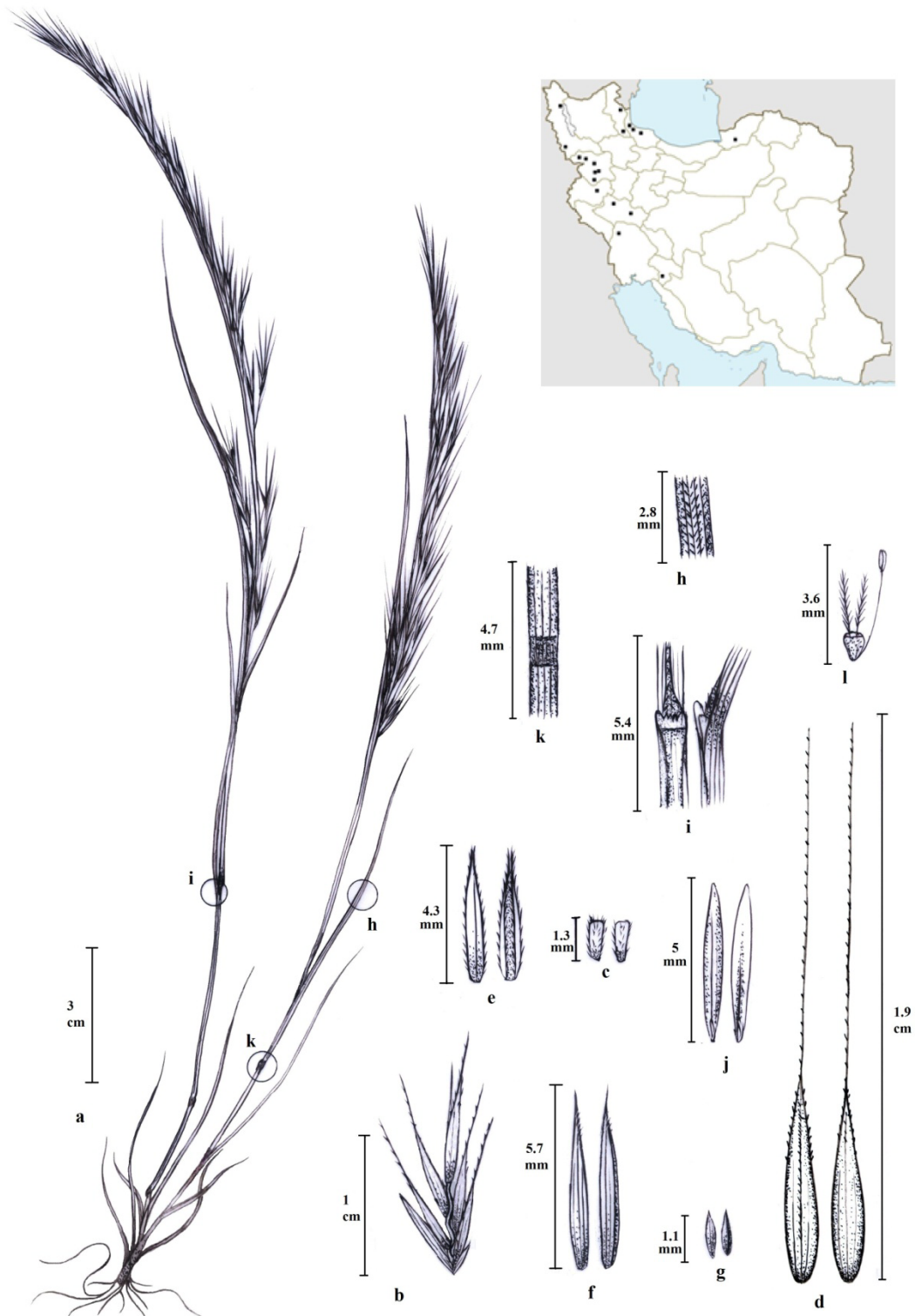


Fig. 1: *Vulpia myuros*. Plant habit (a); spikelet (b); pedicels (c); lemmas (d); palea (e); upper glume (f); lower glume (g); inner surface of blade (h); ligules (i); caryopsis (j); node (k); anther and carpel (l). Map shows the distribution of *V. myuros* in Iran.

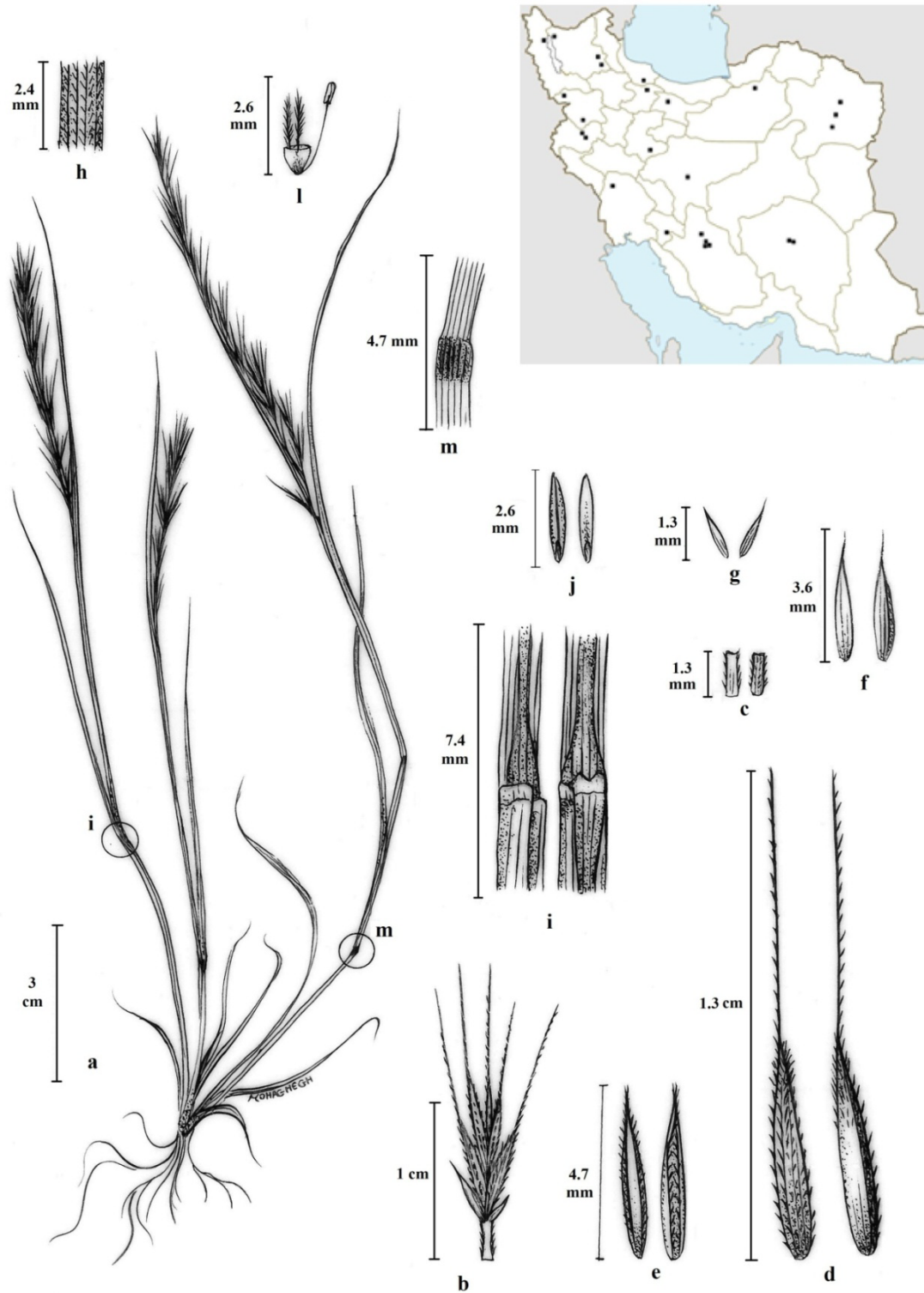


Fig. 2: *Vulpia persica*. Plant habit (a); spikelet (b); pedicels (c); lemmas (d); palea (e); upper glume (f); lower glume (g); inner surface of blade (h); ligules (i); caryopsis (j); node (k); anther and carpel (l). Map shows the distribution of *V. persica* in Iran.

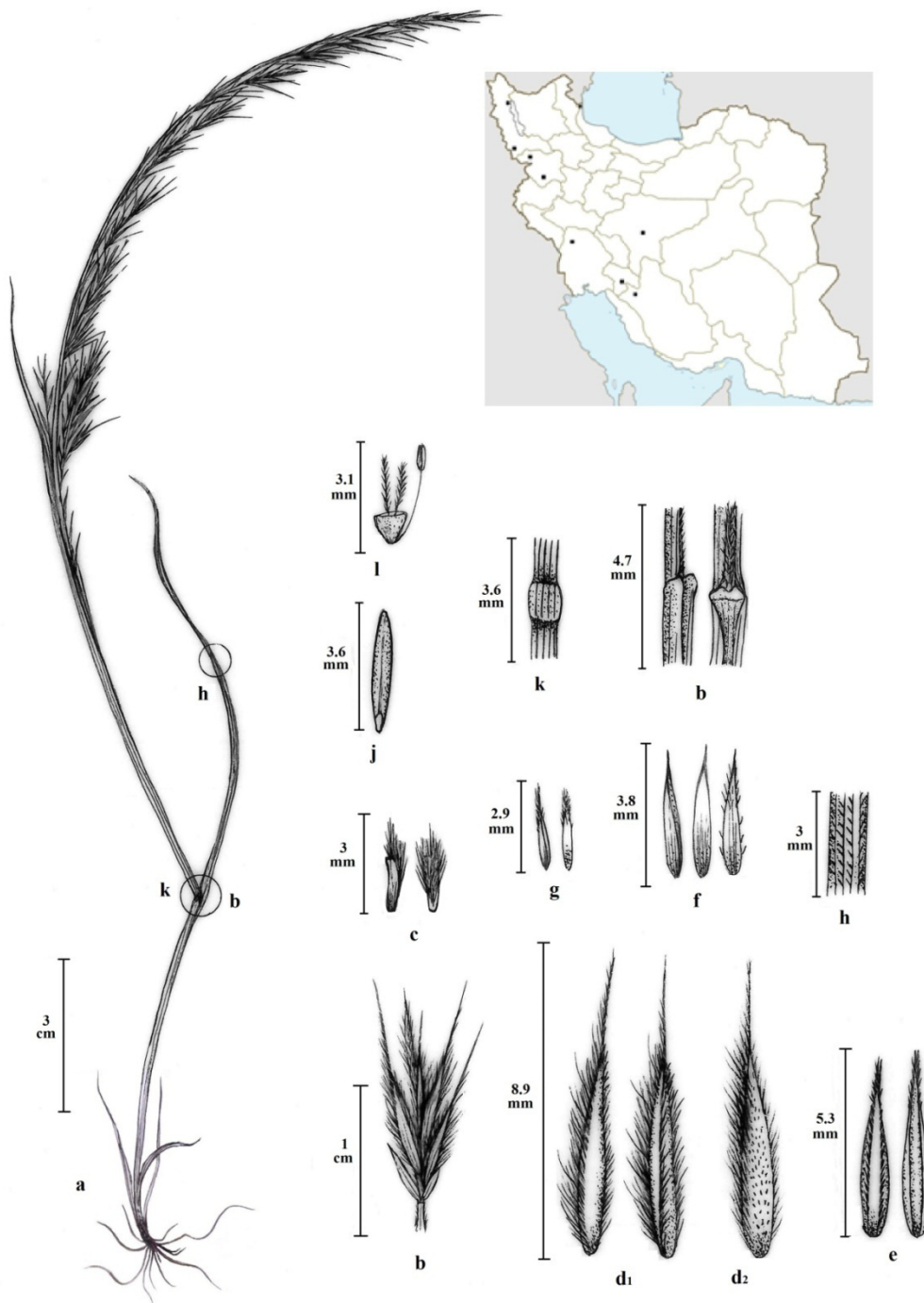


Fig. 3: *Vulpia ciliata*. Plant habit (a); spikelet (b); pedicels (c); lemmas (d) [*V. ciliata* subsp. *plumosa* (d₁) and *V. ciliata* subsp. *ciliata* (d₂)]; palea (e); upper glume (f); lower glume (g); inner surface of blade (h); ligules (i); caryopsis (j); node (k); anther and carpel (l). Map shows the distribution of *V. ciliata* in Iran.

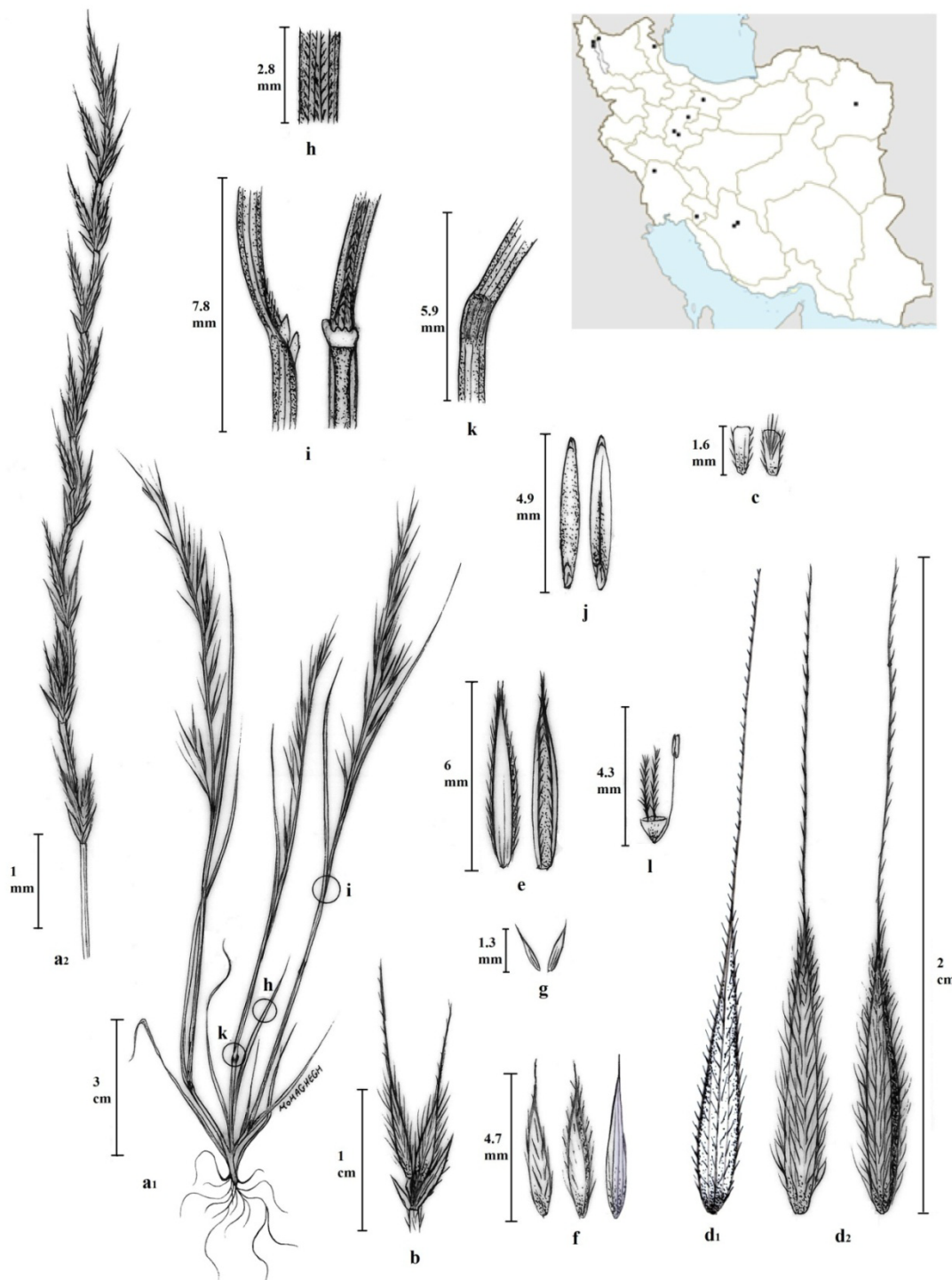


Fig. 4: *Vulpia hirtiglumis*. Plant habit (a); spikelet (b); pedicels (c); lemmas (d); palea (e); upper glume (f); lower glume (g); inner surface of blade (h); ligules (i); caryopsis (j); node (k); anther and carpel (l). Map shows the distribution of *V. hirtiglumis* in Iran.

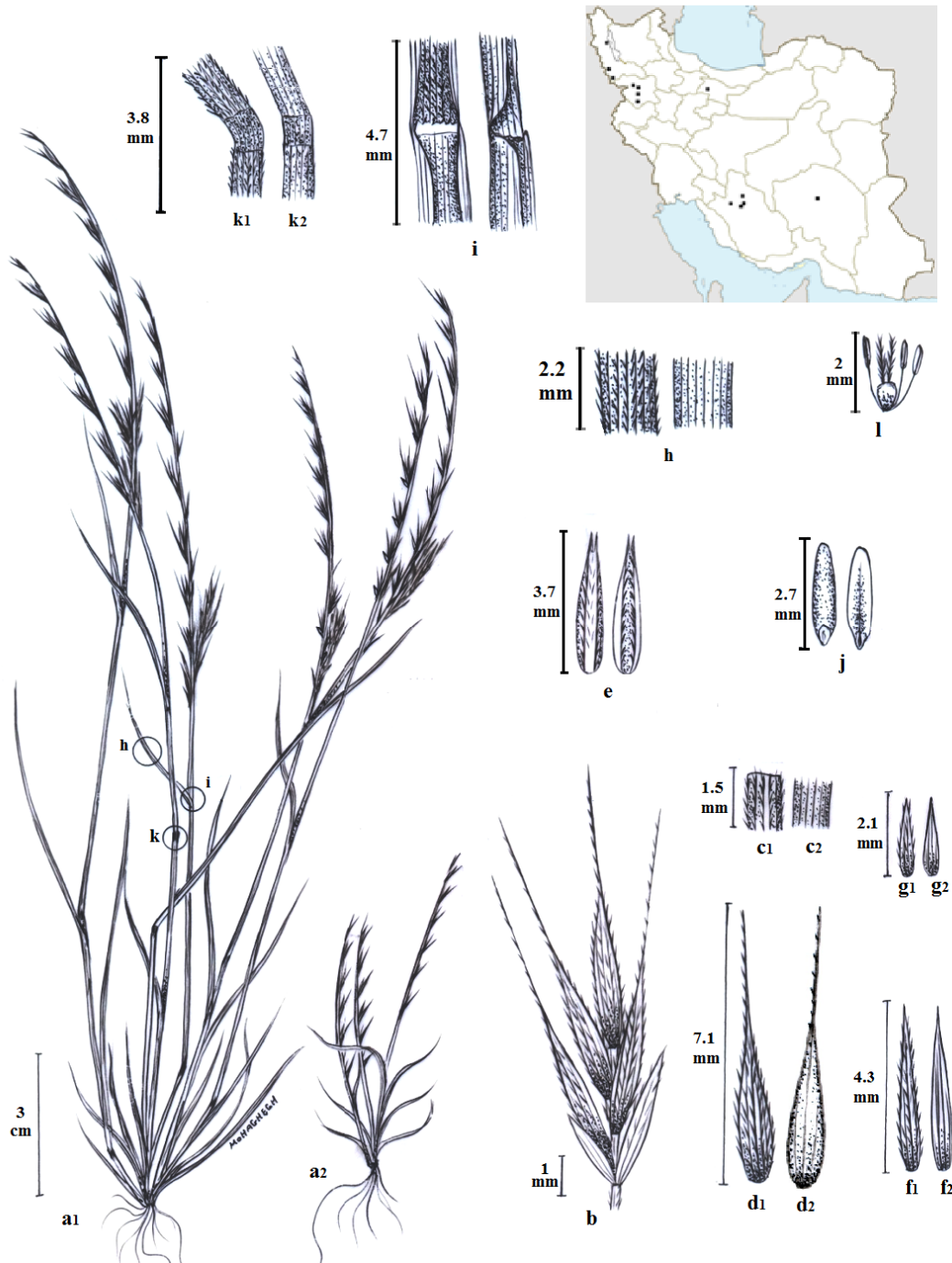


Fig. 5: *Vulpia unilateralis*. Plant habit (a); spikelet (b); pedicels (c) [*V. unilateralis* subsp. *tomentosa* (c₁) and *V. unilateralis* subsp. *unilateralis* (c₂)]; lemmas (d) [*V. unilateralis* subsp. *tomentosa* (d₁) and *V. unilateralis* subsp. *unilateralis* (d₂)]; palea (e); upper glume (f) [*V. unilateralis* subsp. *tomentosa* (f₁) and *V. unilateralis* subsp. *unilateralis* (f₂)]; lower glume (g) [*V. unilateralis* subsp. *tomentosa* (g₁) and *V. unilateralis* subsp. *unilateralis* (g₂)]; inner surface of blade (h); ligules (i); caryopsis (j); node (k) [*V. unilateralis* subsp. *tomentosa* (k₁) and *V. unilateralis* subsp. *unilateralis* (k₂)]; anther and carpel (l). Map shows the distribution of *V. unilateralis* in Iran.

Rahiminejad, **subsp. nov.**, Fig. 5.

Planta typo valde similis sed lemminibus, glumis et rachidibus tomentosis.

Type. Iran, Southwest, Fars province, Shiraz, Sadra region, 1650 m, rocky places, fruiting 07. VI. 2010, Faramarzi 17672 (holotypus, the herbarium of the University of Isfahan, pratypos Kerman: Deh Bakri, 2134 m, 03.06.2012, Zoghi 16956 (the herbarium of the University of Isfahan).

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|---|----------------------------|
| 1. Spikelets without sterile florets: | 5. <i>V. unilateralis</i> |
| 1a-1. Lemmas glabrous to scabrous in the upper part | subsp. <i>unilateralis</i> |
| 1a-2. Lemmas of all flowers pubescent | subsp. <i>tomentosa</i> |
| - Spikelets with sterile florets | 2 |
| 2. Lemmas of all flowers pilose all over the surface or only along the margins | 3 |
| - Lemmas glabrous, but somewhat scabrous | 4 |
| 3. Lemmas long pilose along the margins and also along the midrib and the remaining surface | 3. <i>V. ciliata</i> |
| 3a-1. short pilose or scabrous | subsp. <i>ciliata</i> |
| 3a-2. glabrous | subsp. <i>plumosa</i> |
| - Lemmas densely or sparsely pilose to tomentose | 4. <i>V. hirtiglumis</i> |
| 4. Lower glume 1/2-1/3 × upper | 2. <i>V. persica</i> |
| - Lower glume 1/3-1/6 × upper | 1. <i>V. myuros</i> |

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