NOTES ON MEDICAGO SECT. LUNATAE BOISS. AND TRIGONELLA SECT. BUCERATES BOISS. OF THE TRIBE TRIFOLIEAE (FABACEAE), WITH TWO NEW RECORDS FROM IRAN

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Medicago biflora (Griseb.) E. Small and *Trigonella tenuis* Fisch., two new records of the tribe *Trifolieae* (*Fabaceae*) from Iran, are redescribed. *M. biflora* and *T. tenuis* belong to *M.* sect. *Lunatae* Boiss. and *T.* sect. *Bucerates* Boiss., respectively. The former species is closely related to *M. brachycarpa* (Fisch.) Moris. and the latter to *T. persica* Boiss.

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Key words. Fabaceae, Iran, *Medicago,* new records, *Trigonella.*

گزارش دو گونه جدید Medicago biflora و Trigonella tenuis از تبار Trifolieae در ایران

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Medicgo biflora و *Trigonella tenuis* به عنوان دو گزارش جدید از تبار *Trifolieae* از ایران شرح داده می‌شوند. گونه *M. biflora* متعلق به بخش *Lunatae* و گونه *T. tenuis* متعلق به بخش *Bucerates* می‌باشد. گونه اول به گونه *M. brachycarpa* و گونه دوم به گونه *T. persica* شباهت دارد.

INTRODUCTION

The tribe *Trifolieae* in the family *Fabaceae* consists of six genera: *Medicago* L., *Melilotus* Mill., *Ononis* L., *Parcochetus* Buch.-Ham. ex D. Don, *Trifolium* L. and *Trigonella* L. (Heyn 1981; Lock & Simpson 1991; Mabberly 1997). This tribe as proposed by Berchtold and Presl (1820) is characterised by having trifoliate leaves and stipules that are adnate to the petioles. *Trigonella* are annual or perennial herbs with pinnately trifoliate leaves, often exhaling an odour and look like other grain legumes, important for food and medicine (Chopra et al. 1956; Girardon et al. 1989; Balodi & Rao 1991; Bhatti et al. 1996; Dangi et al. 2004). In Flora Iranica (Rechinger 1984) the genus is represented by 63 annual and perennial species in 12 sections. For the most part, this genus was introduced as sister group to the genus *Medicago.* However, molecular phylogeny confirms the assignment of the medicagoid species from the genus *Trigonella* to *Medicago* (Lesins & Lesins 1979; Small & Jomphe 1998). *Trigonella* was revised by Rechinger (1984) for Flora Iranica and later for certain areas e.g. the Flora of Turkey (Huber-Morath 1969), the Flora of USSR (Grossheim 1945) and Flora of Iraq (Townsend 1974). There are some previous studies focusing on the *Trigonella* species (Boissier 1872; Hedge 1970; Grossheim 1945; Townsend & Guest 1974; Small et al. 1981; Brookes & Small 1988; Small et al. 1990; Al-habori et al. 1998; Pandita et al. 1999; Hamzeh'ee 2000; Murakami et al. 2000; Kabilan et al. 2002; Janighorban 2004; Ranjbar et al. 2009). In this paper two new records, *Medicago biflora* (Griseb.) E. Small and *Trigonella tenuis* Fisch., belong to *M.* sect. *Lunatae* and *T.* sect. *Bucerates,* respectively are reported. All members of *T.* sect. *Bucerates* exist in Iran, with exception of *T. tenuis* that is reported in this paper. Now with this new record, there are 27 annual species belong to 9 sections of the genus *Trigonella* in Iran.

RESULTS

Note on the Medicago sect. Lunatae Boiss.

M. sect. *Lunatae* is characterized by annual herbs, stipules entire or dentate, fruits deflexed or erect, flat, half-ovate to semilunar, sutures unarmed, not winged. Baum (1968) named *T. biflora* and allay species as "medicagoid", since they had similarities in flower and seed structures with those of *Medicago*. In 1987, Small et al. suggested that this unclear delimitation between

two genera could be resolved by considering the explosive tripping pollination mechanism. These floral features involve a complicated arrangement of the keel. *Medicago* and medicagoid species share this morphological feature (even if it remains residual and nonfunctional in some selfing species), whereas all *Trigonella* species s. str. do not have it. Based on this complex morphological character, Small et al. (1987) proposed that these 23 atypical species of the genus *Trigonella*, known as the medicagoid species, should be transferred to the genus *Medicago*, and that these morphological features serve as discriminators of *Medicago* and the medicagoid species collectively from the two other genera, *Trigonella* and *Melilotus* (Bena 2001).

Key to the species of Medicago sect. Lunatae in Iran

1- Pod 4–6 × 3–5 mm, leaflets 9–15 × 3–7 mm, corolla 2.5–3 mm ong, inflorescence sessile, rarely with peduncle up to 1 cm long **M. brachycarpa** M. Bieb.
- Pod 15–22 × 8–10 mm, leaflets 5–10 × 4–6 mm, corolla ca. 7 mm long, inflorescence with peduncle 3–8 mm long **M. biflora** (Griseb.) E. Small

Medicago biflora (Griseb.) E. Small

Syn. *Trigonella biflora* Griseb.; *Trigonella lunata* Boiss. non *Medicago lunata* Reinchenb.

Annual herbs, 8–8.5 cm tall. Stems weak, ascending, rarely erect, up to 2 cm long, branched at the base, white hairs softly glandular-pubescent on vegetative parts. Stipules ovate-lanceolate, acuminate at tip, 4–5 × 1–2 mm, herbaceous. Leaves 12–14 mm long, rachis thin, straight or curved ascending, densely erect hairy, 0.2–1 mm long; petiole ca. 6 mm long; leaflets obovate to cuneate, 5–8 × 3–4 mm. Inflorescence 1–3-flowered; flowers subsessile. Pedicel 4–8 mm long. Calyx greenish, 5–6 mm long, densely pubescent hairy; teeth ca. 3 mm long, linear or subulate. Petals yellow, brown to yellowish when dried. Standard ca. 8 × 5 mm. Wings ca. 7 × 1.5–2 mm, oblong, round at tip; claw filiform, ca. 3 mm long. Keel shorter than wings, ca. 6 mm long; limb ca. 3 × 2 mm; claw ca. 3 mm long. Stamen ca. 7 mm long; the free segment ca. 2 mm long. Pods purple horizontally spreading, elliptic, slightly curved, 13–15 × 8–9 mm, with numerous slender parallel veins, terminating to a short slightly curve**,** with minutely setose appressed hairs on margin disc.

Distribution and habitat. Medicago biflora has been collected from only single locality in East Azerbaijan Province (Fig. 1). The presence of *M. biflora* in Iran is an example for the close relationship between *Medicago* in Iran and Caucasus. Some morphological characters such as flat, elliptic or slightly curved pods with 13–15 × 8–9 mm in size and having numerous slender parallel veins terminating to a short slightly curve in the new record are important characters for including in the genus *Medicago*.

Specimen examined. Azerbaijan: Between Meshkin-Shahr and Ahar, Now-Duz (Naqduz), 1100 m, 30.5.1978, Wendelbo & Assadi 27901 (TARI).

Note on the Trigonella sect. Bucerates Boiss.

Trigonella sect. *Bucerates* in Iran is represented by 10 species and 4 subspecies. Members of the section distributed phytogeographically in the Irano-Turanian region. *T.* sect. *Bucerates* is morphologically characterized by annual herbs, stipules at least in part dentate or incised, keel and wings tightly joined, and the legumes erect or spreading, linear, reticulate or transversely-nerved, and their sutures thickened (Boissier 1872; Rechinger 1984; Hedge 1970; Grossheim 1945, Townsend & Guest 1974).

Key to the species of Trigonella sect. Bucerates in Iran

1- Inflorescence with peduncle 5–40 mm long 2
- Inflorescence sessile 6
2- Fruiting inflorescence stellate **T. astroites** Fisch. & C. A. Mey.
- Fruiting inflorescence not stellate 3
3- Standard shorter than 5 mm, inflorescence (1) 2– 3 (4)-flowered **T. tenuis** Fisch.
- Standard 5–10 mm long, inflorescence 2–14-flowered 4
4- Pod 30–40 mm long, peduncle shorter than 20 mm **T. persica** Boiss.
- Pod shorter than 30 mm, peduncle 10–40 mm long 5
5- Standard 7–10 mm long, peduncle (15) 30–40 mm long, inflorescence 8–14-flowered **T. aurantiaca** Boiss.
- Standard 5–8 (9) mm long, peduncle shorter than 30 mm, inflorescence 4–10-flowered**T. fischeriana** Ser.
6- Inflorescence 1–2 (3)-flowered, pod shorter than 100 mm 7
- Inflorescence 2–10-flowered, pod 10–35 mm long 9
7- Standard 4–5 mm long **T. uncinata** Banks & Soland.
- Standard 6–8 mm long 8
8- Inflorescence with peduncle 0–4 mm long, pod 30–100 mm long, straight or mostly curved at tip **T. monantha** C. A. Mey.
- Inflorescence sessile, pod shorter than 70 mm, with hooked tip **T. macroglochin** Durieu
9- Pod 10–35 mm long, straight, erect 10
- Pod shorter than 25 mm, strongly arched-recurved

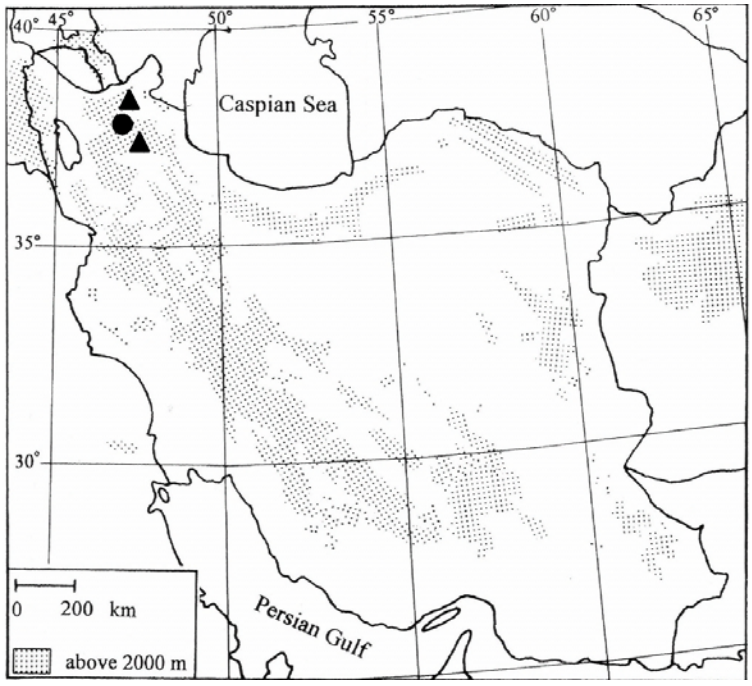

Fig. 1. Distribution of *Trigonella tenuis* (▲) and *Medicago biflora* (●) in Iran.

T. arcuata C. A. Mey.

10- Inflorescence 4–10-flowered, pod compressed, close-clustered **T. crassipes** Boiss.

- Inflorescence (1) 2–5-flowered, pod non-compressed, loose clustered **T. orthoceras** Kar. & Kir.

Trigonella tenuis Fisch.

Annual herbs, 9–21 cm tall. Stems commonly branched from base, often procumbent, rarely erect, and sparingly short-hairy. Stipules semisagittate, 2–3 × 1–1.5 mm. Leaves 5–16 mm long, sparsely or loosely hairy, 0.2–0.5 mm long; petiole 4–14 mm; leaflets obovate or elliptic, sharply dentate, 5–8 ×3–4 mm, on both sides sparsely covered with appressed white hairs, 0.2–0.5 mm long. Peduncle slender, 12–25 mm long. Inflorescence umbelliform, (1) 2–3 (4, 5)-flowered. Flowers subsessile. Calyx shorter than corolla, 2.5–3 mm long, sparsely or loosely hairy; teeth 0.8–1 mm long, lanceolate or subulate. Corolla yellow. Standard ca. 4 × 2 mm. Wings ca. 3 × 0.8–1 mm, oblong, round at tip; claw ca. 1.5 mm long. Keel as long as wings, ca. 3 × 1 mm; claw ca. 1.5 mm long. Stamen ca. 3 mm long. Pods 10–25 × 1–1.3 mm, arched-recurved, rarely suberect, linear, and transversely reticulate; beak very short. Seeds 4–8, ca. 2 mm long, tuberculate-rugose.

Distribution and habitat. Trigonella tenuis was recently collected in the field and known only from northwestern Iran. Our material seems to match with the original description and type specimen of *T. tenuis*. The type of *T. tenuis* differs from the typical morphology of other species of *T.* sect. *Bucerates* by having smaller and fewer flowers. The new record comes from mountainous slopes in Ardebil province (Fig. 1), close to Talish and is a further example of a close relationship between the annual *Trigonella* in Iran and Azerbaijan country.

Specimen examined. Azerbaijan: Ardebil to Khalkhal, Bahreman, 1800 m, 6.6.2010, Rnjbar & Hajmoradi 19601. Ahar to Kalibar, 4 km before Gardehsang, 41 km to Kalibar, 1840 m, 7.6.2010, Rnjbar & Hajmoradi 19602 (BASU).

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