

LINARIA MAZANDARANENSIS AND L. GOLESTANENSIS (SCROPHULARIACEAE), TWO NEW SPECIES FROM IRAN

S. M. M. Hamdi, M. Assadi, F. Fallahian & A. A. Maassoumi

Hamdi, S. M. M., Assadi, M., Fallahian, F. & Maassoumi, A. A. 2006 01 01: *Linaria mazandaranensis* and *L. golestanensis* (Scrophulariaceae), two new species from Iran. -Iran. Journ. Bot. 11 (2): 251-258. Tehran.

Linaria mazandaranensis and *Linaria golestanensis* are described as new species from Mazandaran and Golestan provinces. These species belong to the section *Speciosae*. The new species are compared with their closest relative *Linaria genistifolia* (L.) Mill. *Linaria mazandaranensis* differs from *Linaria genistifolia* in the length and breadth of the corolla, bracts, spur, testa cells form and also length of the seed. *L. golestanensis* differs from *Linaria genistifolia* in shorter stem, leaf length and breadth, calyx form, length of pedicel, bracts and seed, form and length of testa cell.

Key words. Taxonomy, *Linaria*. *Scrophulariaceae*, new species and Iran.

Fathollah Fallahian and Seyed Mohammad Mehdi Hamdi, Azad Islamic University, Tehran Science & Research branch, Faculty of Science, Department of Biology, Tehran, Iran, e-mail <mm-hamdi @ asia.com.> - Mostafa Assadi & Ali Asghar Maassoumi, Research Institute of Forests & Rangelands, P. O. Box .13185-116, Tehran, Iran .

دو گونه جدید از جنس *Linaria* در ایران

سید محمد مهدی حمدی، مصطفی اسدی، فتح الله فلاحیان و علی اصغر معصومی
گونه‌های *Linaria golestanensis* و *Linaria mazandaranensis* از ایران نامگذاری و معرفی می‌شوند. این گونه‌ها متعلق به بخش *Speciosae* هستند و با گونه *L. genistifolia* مقایسه می‌شوند. گونه *L. mazandaranensis* با گونه *L. genistifolia* در طول پرچم، مهمیز، دم گل، جام، اندازه سلول‌های پوششی دانه، ضخامت دیواره کپسول، طول و عرض سلول‌های پوششی کپسول، تزئینات سطح کپسول و شکل سلول‌های پوششی کپسول اختلاف دارد. از طرفی گونه *L. golestanensis* با گونه *L. genistifolia* در شکل و اندازه سلول‌های پوششی دانه، تزئینات سطح سلول‌های پوششی دانه، شکل سلول‌های پوششی کپسول، طول و عرض سلول‌های کپسول، طول و عرض سلول‌های پوششی دانه، ضخامت دیواره کپسول و دانه، طول دم گل، طول و عرض کاسبرگ با هم اختلاف دارند.

Introduction

The genus *Linaria* is widely distributed throughout the world, except in America. This genus comprises annual or perennial herbs with a wide variety of habitats, including dry and sandy places and rocky slopes. Sutton (1988) recognized 150 species from the genus *Linaria* of which altogether 22 occur in Iran. A revision of the genus in Iran has been done. Studies are based on materials of different herbaria in Iran including TARI, IRAN, TUH, etc. and also field observations. In addition to macromorphological characters, micromorphological characters of seeds and capsules are used. During this study two new species were found which are described in this paper.

Linaria mazandaranensis S. M. M. Hamdi & M. Assadi, **sp. nov.**, (Figs. 1, 3, 4).

Typus. Iran, Mazandaran prov., Ghaem-shahr, toward Firouz-Kuh, 8 km West-South of Pole-Sefid, 1720 m, Moosavi 33702 (holotypus IRAN).

Planta perennis, herbacea, glauca, glabra, erecta; caules fertiles 35-40 cm longi, supra ramosi. Folia calinum fertiliium 25-30 × 5-6 mm, alterna, lanceolata, acuta. Inflorescentina 3-4 cm longa, floribus 5-7, laxa. Bracteae 4 × 0.7 mm, acutae, lanceolatae. Pediceli 1.5-2 mm longi. Calycis lobi aequales, 4 × 1.2 mm, acuti, lanceolati, non scariosi. Corolla 30-32 mm longa, flava; tubus ore 8-9 mm latus; sinus lobii 2.5 mm longi; calcar 15-16 mm longum, ad basem 2-2.5 mm latum, rectum. Capsula 3-3.5 × 3 mm, calyce breviora. Semina 1.2 × 0.7 mm, alata, tri- vel tetrahedrales, laevia.

Glaucous perennial herb, many branched above, glabrous, erect; fertile stems 35-40 cm. long, branched. Leaves of fertile stems 25-30 × 5-6 mm, alternate, lanceolate, acute, lax. Inflorescence 3-4 cm long with 5-7 flowers, lax in flowering and fruiting stages. Bracts 4

× 0.7 mm, lanceolate, acute. Pedicels 1.5-2 mm long. Calyx lobes equal, 4 × 1.2 mm, acute, lanceolate, not scarious. Corolla 30-32 mm long, yellow; tube 8-9 mm broad at mouth; abaxial lip sinus 2.5 mm, the distance between lip tips 2.5 mm; spur 15-16 mm long, 2-2.5 mm broad at base, straight, equaling the rest of corolla. Capsule 3-3.5 × 3 mm, shorter than the calyx. Seeds 1.2 × 0.7, trigonous or tetrahedral, blackish-brown, smooth on the surface.

The new species is an alpine and subalpine endemic of upper hyrcanian province, N. Iran. It grows on grassland communities. The new species is related to *Linaria genistifolia* but differs from it in many characters which are shown in tables 1 and 2.

Linaria golestanensis S. M. M. Hamdi & M. Assadi, **sp. nov.**, (Figs. 2, 3, 4).

Typus. Iran, Golestan Prov; East-South of Maraveh-Tapeh, Shalmi mountain, 1200 m, Faghih-Nia & Zangouii 32889 (holotypus TARI).

Planta perennis, herbacea, glauca, glabra, erecta; caules fertiles 80-90 cm longi, supra ramosi. Folia calinum fertiliium 55-60 × 30-32 mm, alterna, lanceolato-elliptica, acuta. Inflorescentina 5-12 cm longa, floribus 7-25, laxa. Bracteae 5 × 1.5 mm, acutae, lanceolatae. Pediceli 1.5-2 mm longi. Calycis lobi aequales, 6-7 × 2 mm, acuti, lanceolati, non scariosi. Corolla 27-32 mm longa, flava, ore 8-10 mm lata; sinus lobii 2 mm longi; calcar 14-15 mm longum, ad basem 1-1.2 mm latum, rectum. Capsula 4 × 2-3 mm, calyce breviora. Semina 2.7 × 1.6 mm, alata, tri- vel tetrahedrales, laevia.

Glaucous perennial herb, erect. Fertile stems 80-90 cm. long, branched above. Leaves of fertile stems 55-60 × 30-32 mm, acute, lanceolate-elliptic, alternate; distance of leaves 2-3 mm long. Inflorescence 5-12 cm long with 7-25 flowers, lax in flowering and fruiting



Fig. 1. *Linaria mazandaranensis*. (a) habit; (b) flower, $\times 3$; (c) calyx, $\times 3$; (d) capsule, $\times 3$; (e) stamen, $\times 3$; (f) flower, abaxial lip sinus, $\times 3$; (g) sterile stamen.



Fig. 2. *Linaria goletanensis*. (a) habit; (b) flower, $\times 3$; (c) calyx, $\times 3$; (d) capsule, $\times 3$.

Table 1. Comparison of the new species with *Linaria genistifolia*.

characters	<i>L. genistifolia</i>	<i>L. golestanensis</i>	<i>L. mazandaranensis</i>
corolla (mm)	20-25×8-11	27-32×8-10	30-32×8-9
the length & breadth of spur (mm)	11-12×1-2	14-15×1-1.2	15-16×2-2.5
pedicel (mm)	3-4.5	1.5-2	1.5-2
bract (mm)	4-5×1.2	5×1.5	4×0.7
the length & breadth of calyx lobes (mm)	3.5-4.5×1.5-2	ca. 5×2	4×1.2
leaf size (mm)	25-30×4-6	55-60×30-32	25-30×5-6
stem size (cm)	40-45	80-90	35-40
capsule size (mm)	3.5-4×3-3.5	4×2-3	3-3.5×3
seed size (mm)	1×1.5	2.7×1.6	1.2×0.7
abaxial lip sinus of corolla (mm)	1.75-2	2	2.5
distance of two apex at abaxial lip (mm)	6-7	2.5	2.5
seed form (mm)	trigonous, tetrahedral	trigonous, tetrahedral	terigonous, tetrahedral
style size (mm)	10	10	9
tall stamen (mm)	13	15	12
short stamen (mm)	10	12	7
sterile stamen (mm)	1	1.5	4.5

Table 2. Comparison of the new species with *Linaria genistifolia*.

characters	<i>L. genistifolia</i>	<i>L. golestanensis</i>	<i>L. mazandaranensis</i>
testa cell form of seed	flat	flat+ papillate	smooth
cell form of capsule	pentagonal & hexagonal	Irregular	elliptic or irregular
the length of testa cell of seed (μm)	35-40	40-47	30-33
the breadth of testa cell of seed (μm)	15-20	27-33	15-17
the length of capsule cell (μm)	22-30	60-80	30-35
the breadth of capsule cell (μm)	17-20	20-30	15-20
cell wall thickness of seed (μm)	4-6	6-7	5-10
cell wall thickness of capsule (μm)	3-5	1-1.5	1-1.2

stages. Bracts 5 × 1.5 mm, acute, not scarious. Pedicels 1.5- 2 mm long in flowering and fruiting stages. Calyx-lobes equal, 6-7 × 2 mm, acute, lanceolate, not scarious. Corolla 27-32 mm long, yellow; tube 8-10 mm broad at mouth, abaxial lip sinus 2 mm and the distance between the tips of lips 2.5 mm; spur 14-15 mm long, 1-1.2 mm broad at base, straight, equaling the rest of corolla. Capsule 4 × 2-3 mm, smooth. Seeds 2.7 × 1.6 mm., trigonous

or tetrahedral, blackish-brown with ridges at the face and few interstitial papillate cells.

The new species is related to *Linaria genistifolia* and *L. mazandaranensis* which are compared in tables 1 and 2. Moreover, the following key is presented to distinguish these species.

Key to the species

1. Corolla 20-25 mm long and 6-8 mm broad, the distance between the apex of abaxial lip sinus 6-8 mm. **L. genistifolia**

- Corolla at least 25 mm long and 8-10 mm broad, the distance between the apex of abaxial lip sinus 2.5 mm 2

2. Seeds smooth on the surface, tall stamens 12 and short stamens 7 mm long, the length and breadth of calyx lobes 4×1.2 mm, corolla 30-32 mm long **L. mazandaranensis**

2. Seeds tuberculate on the surface, tall stamens 15 and short stamens 12 mm long; the length and breadth of calyx-lobes ca. 5 × 1.2 – 2 mm, corolla 27-32 mm long **L. golestanensis**

Acknowledgment

The authors wish to thank Mrs. N. Sadeghi for scanning seed coat and Mr. Mahranfard, IRAN Herbarium for drawing the illustrations.

References

Sutton D. A. 1988: A Revision of the tribe Antirrhineae. - British Museum (Natural History) Oxford University Press London & Oxford.

Elisens NJ.1985: The systematic significance of seed coat anatomy among new world species of tribe Antirrhineae (Scrophulariaceae). -Systematic Botany 10:282-299.

Davis, P. H., 1982: Scrophulariaceae in Flora of Turkey vol. 6: 458-748. -Edinburgh University Press.

Komarov V. L. 1934 : Scrophulariaceae in Flora of the U.R.S.S. vol. 22:202-258. - Moskva & Leningrad.

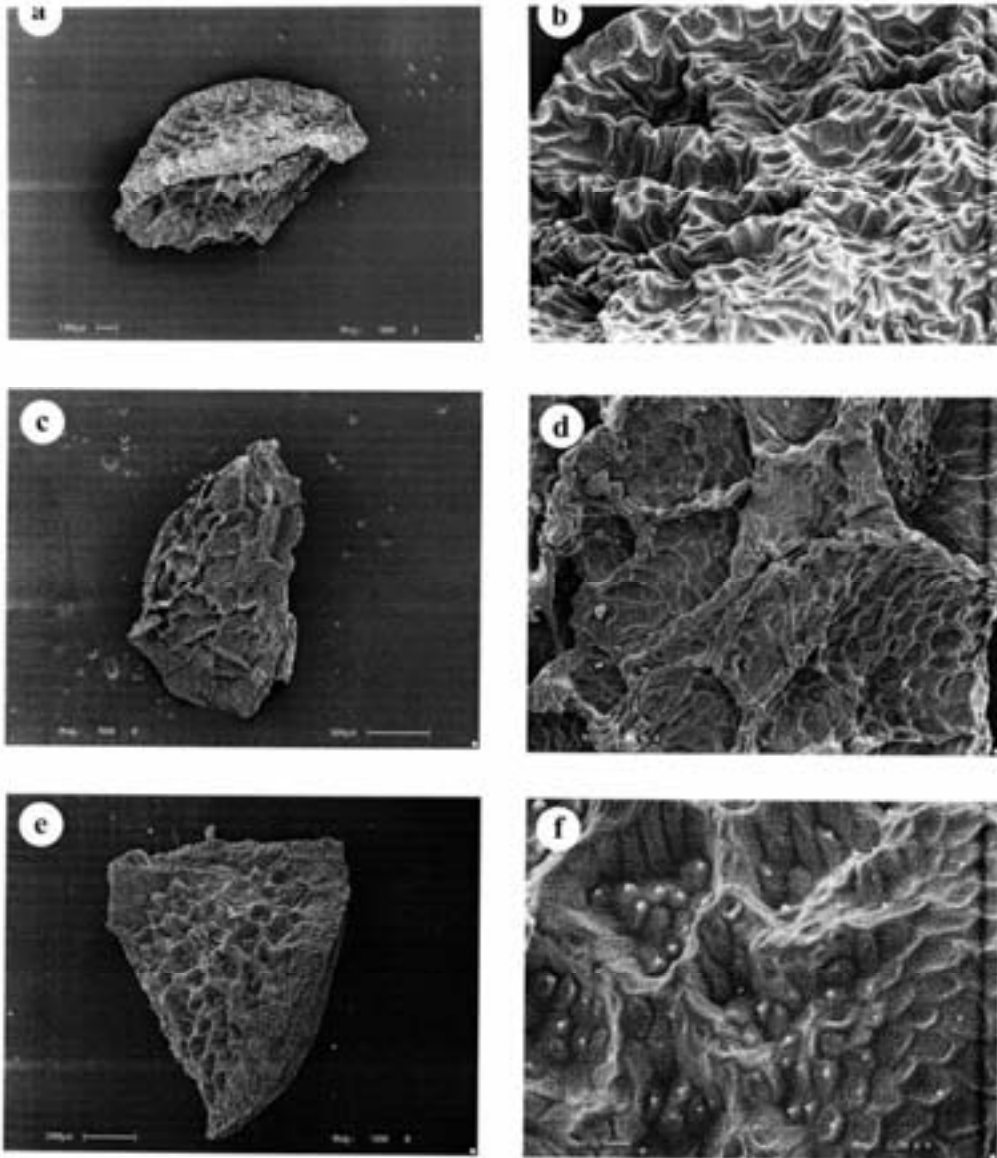


Fig. 3. Scanning electron micrographs of seeds of *Linaria*. (a) *L. genistifolia*: oblique lateral view of seed showing almost contiguous ridges on faces. Scale=100 μm . (b) *L. genistifolia*: ridges from faces with flat tubercle cells. Scale=30 μm . (c) *L. mazandaranensis*: oblique lateral view with smooth surface. Scale= 300 μm . (d) *L. mazandaranensis*: view, showing broad marginal ridges and frequently anastomosed ridges on faces. Scale=200 μm . (e) *L. golestanensis*: oblique lateral view, showing broad marginal ridges and frequently anastomosed ridges on faces. Scale= 200 μm . (f) *L. golestanensis*: ridges from face with few interstitial papillate cells. Scale= 20 μm .

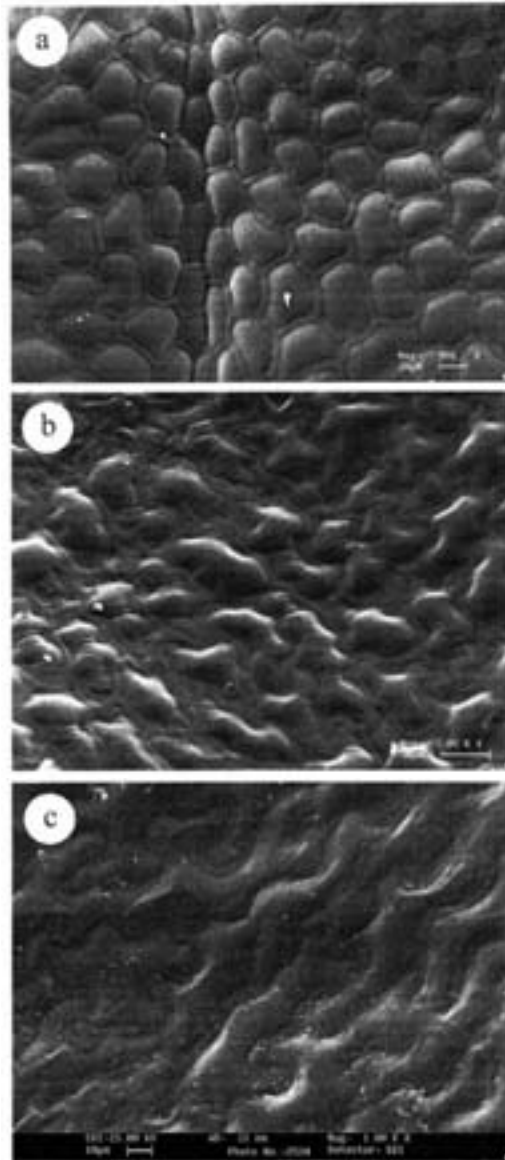


Fig. 4 (a). *Linaria genistifolia*. Inside of dehisced capsule at base of valve showing elongate cells along line of dehiscence. Scale=20 μ m. Fig. 4 (b). *Linaria mazandaranensis*, inside of dehisced capsule at base of valve showing polygonal cells along line of dehiscence. Scale=30 μ m. Fig. 4 (c). *Linaria golesanensis*, inside of dehisced capsule at base of valve showing elongate cells along the line of dehiscence. Scale=10 μ m.