

A revision of the genus *Roemeria* in Iran

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Abstract

In this study, a taxonomic status of the genus *Roemeria* in Iran is reviewed. The study of morphological characters of collected and herbarium specimens led to the introducing of two new taxa, namely, *R. hybrida* subsp. *maculata* and *R. refracta* var. *alba*. In addition, five synonymies are made as following: *R. refracta* var. *albomarginata* and *R. refracta* subsp. *occidentalis* as synonymies of *R. refracta* var. *refracta*; *R. hybrida* subsp. *dodecandra*, *R. latiloba*, and *R. hybrida* var. *hispidissima* as synonymies of *R. hybrida* subsp. *hybrida*. The identification key and diagnostic characters of taxa and their geographical distribution are presented here.

Keywords: Identification key, new synonyms, new taxa, *Papaveraceae*, taxonomy

مروری بر تاکسونومی جنس *Roemeria* در ایران

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خلاصه

در این پژوهش، موقعیت تاکسونومیک جنس *Roemeria* متعلق به تیره خشخاش در ایران مورد بازنگری قرار گرفت. مطالعه نمونه‌های جمع‌آوری شده و هرباریومی، منجر به معرفی دو آرایه جدید به نام‌های *R. hybrida* subsp. *maculata* و *R. refracta* var. *alba* گردید. همچنین، پنج مترادف‌سازی به شرح زیر انجام شد: *R. refracta* var. *albomarginata* و *R. refracta* subsp. *occidentalis* به عنوان مترادف‌های *R. refracta* var. *refracta* و *R. hybrida* subsp. *dodecandra* و *R. latiloba* و *R. hybrida* var. *hispidissima* به عنوان مترادف‌های *R. hybrida* subsp. *hybrida*. کلید شناسایی، ویژگی‌های متمایزکننده و پراکنش جغرافیایی همه آرایه‌های متعلق به این جنس در ایران بیان می‌شود.

واژه‌های کلیدی: آرایه‌شناسی، آرایه‌های جدید، تیره خشخاش، کلید شناسایی، مترادف‌های جدید

Introduction

Fedde (1909) classified nine species and 10 varieties in the genus *Roemeria* Medic. (*Papaveraceae*). Of these, four species including *R. hybrida* (L.) DC. with one variety; *R. latiloba* (Hauskn. et Bornm.) Fedde; *R. dodecandra* (Forssk.) Stapf with two varieties; *R. refracta* DC. with one variety and two doubtful species, namely, *R. vermiculata* Lehn. ex Sweet and *R. macrostigma* Bienert were reported for Iran.

In Flora Iranica (Cullen 1966), the genus comprises two species, namely, *R. refracta* and *R. hybrida* subsp. *dodecandra* (Forsskn.) Maire, and doubtful species, *R. macrostigma* in Iran while in Flora of Iran (Parsa 1986) the genus was reported by four species and four varieties and two doubtful species from Iran that are: *R. refracta* var. *trichocarpa* Fedde et Schlockow; *R. hybrida* var. *hispidissima* Fedde; *R. hybrida* var. *velutina* DC.; *R. hybrida* var. *velutina-eriocarpa* Fedde and two doubtful species, *R. macrostigma* and *R. latiloba*. *Roemeria dodecandra* was also reduced into synonymy of *R. hybrida*.

On the other hand, the genus is presented in Europe by one species and one subspecies as *R. hybrida* subsp. *hybrida* (Mowat 1964), while Popov (1937) in Flora of the USSR, reported it with two species, namely, *R. hybrida* and *R. refracta* and *R. dodecandra* as a synonym of *R. hybrida*.

Finally, Cullen (1957) and Jafri & Quisar (1974) introduced the genus by two species and two subspecies: *R. refracta* and *R. hybrida* subsp. *hybrida* and subsp. *Dodecandra*, of which subsp. *hybrida* was not reported from Iran.

Anatomical study of some species of the family *Papaveraceae* (Heydari & Attar 2012) showed that anatomical features of fruit are useful in identification of species of the genus *Roemeria* and other genera.

The genus *Roemeria* is well-differentiated with the species of *Papaver* sect. *Argemonidium* Spach in capsule and petal characters (Kadereit 1986), whereas based on molecular analyses by Carolan *et al.* (2006) these two taxa are sister to each other. This placement confirmed by molecular results of Kadereit and Sytsma (1992) and Kadereit *et al.* (1997).

The aim of the present study is to review the Iranian taxa of the genus *Roemeria*.

Materials and Methods

This study was mainly based on collected and herbarium specimens of TARI, IRAN, TUH, FAR herbaria and also field observations. The specimens were studied using Flora Iranica (Cullen 1966), Flora of Turkey (Cullen 1965), Flora of Iraq (Cullen 1957), Flora of Pakistan (Jafri & Quisar 1974), Fedde (1909) and Flora of the USSR (Popov 1937). The specimens are deposited in TARI and FAR herbaria.

Results and Discussion

This study shows that, the following characters have taxonomic value: presence/absence of bristles between stigmatic lobes; glabrous or setose capsules; petal color and presence/absence of petal spot. Finally, our taxonomic study resulted in reporting two new varieties and five new synonymies for the Iranian flora of the genus *Roemeria*.

Description of the genus *Roemeria* Medicus

Annual herbs; leaves bi-tripinnate; flowers solitary; calyx mostly hairy; petals red, violet or sometimes white, with or without spot; stamens numerous; filaments attenuate toward the apex and base; anthers oblong, purple or yellow; ovary with or without hairs, with or without 3–4 setae between stigmatic lobes; capsules linear or linear-cylindrical; dehiscent by 3–4 valves, from apex to base.

Key to the species of the genus *Roemeria* in Iran

1. Petals mostly red, sometimes white; capsules glabrous or occasionally hairy, with 3–4 setae between stigmatic lobes *R. refracta*
 - Petals violet, sometimes red; capsules hairy or occasionally glabrous, without setae between stigmatic lobes *R. hybrida*

1. *R. refracta* DC., Reg. Veg. Syst. Nat. 2: 93 (1821)

Annual herbs, 4–51 cm high. Leaves pinnatisect-pinnapartite; segments pinnatilobed-pinnatisect; ultimate lobes linear, oblong or oblong-ovate. Pedicels 2–14 cm long, hairy. Buds narrowly or broadly obovate; calyx hairy. Petals red, sometimes white, with basal black spots; sometimes spots with white margins. Ovary

glabrous or with adpressed hairs, with 3–4 bristles between stigmatic lobes; capsules 2–8 cm long, cylindrical, attenuate toward the apex; dehiscent by 3–4 valves.

Geographical distribution: Turkey, Iran, Caucasus, Transcaucasus, Turkmenistan, Afghanistan and Pakistan

Identification key to the varieties of *Roemeria refracta* in Iran

1. Capsules glabrous *R. refracta* var. *refracta*
 - Capsules hairy 2
 2. Petals red *R. refracta* var. *trichocarpa*
 - Petals white *R. refracta* var. *alba*

Roemeria refracta var. *refracta* [Fig. 1 (A)]

= *R. refracta* var. *albomarginata* Fedde in Pflanzenr. 40 (4: 104): 243 ≡ *R. refracta* subsp. *occidentalis* Kadereit in Flora. 179 (2): 138. syn. nov.

Petals red, with basal black spots; spots with or without white margins. Ovary glabrous.

Specimens examined: Golestan province, Gorgan, 2 km S. of Golidaragh, 1080 m, 23.5.1976, Hewer 3854 (TARI); Mazandaran province, Larijan, Rineh, Khomneh (10 km W. Rineh), 2900 m, 11.5.1980, Moussavi *et al.* 58373 (IRAN); Azerbaijan province, Ardebil, Razi, 1730 m, 24.6.1973, Makouii 10006 (TARI); Kaboudan Island, 1275–1500 m, 20.5.1998, Sangari *et al.* 58375 (Iran); Lorestan province, Khorramabad, Veissina, Dogar, 1300 m, 11.5.1999, Veiskarami 23625 (TUH); Esfahan province, Kashan, Ravand-e Banasareh, 1550 m, 29.4.1974, Dini & Bazargan 80210 (TARI); Khorassan province, 55 km W. of Kalate Naderi, near Polgerd, Massoumi 55754 (TARI); Qucah, Chenaran, Band-e Akhlamad, 1600 m, 10.5.2001, Ghahraman *et al.* 27489 (TUH); Tehran province, on the

Firuzkuh road, Shalambe village, 1950 m, 19.5.1973, Bazargan & Arazm 14750 (TARI).

Among studied specimens, the individuals were observed which basal spot of petals had apical white margin (introduced as var. *albomarginata* or subsp. *occidentalis*) and the individuals without apical white margin (type variety) whereas we found individuals by presence of basal black spot but with or without white margin in one flower. Hence, *R. refracta* var. *albomarginata* and subsp. *occidentalis* are reduced as synonymies of *R. refracta* var. *refracta*.

Roemeria refracta var. *trichocarpa* Fedde et Schlockow in Pflanzenr. 40 (4: 104): 244 [Fig. 1(B)]

Petals red, with basal black spots; spots with or without white margins; ovary with sparse to rather dense hairs at the apex or base or with dense and adpressed hairs along entire length.

Specimens examined: Azerbaijan province, Urumieh, Band road, 27.5.1974, Siami 5285 (TARI); 35 km Urumieh toward Sero, 1880–1910 m, 11.6.1978, Matin & Daneshpajouh 58367-B (38443-E) (IRAN); Fars province, Shiraz, Bamou

Park, 190 m, 5.6.1974, Dehbozorgi 3277 (TARI); Marvdasht, Dorudzan dam, 1657 m, 4. 4.2013, Zeraatkar 54316 (FAR); Khorassan province, 20 km after Mashhad to Torbate-e

Heydarieh, 1640 m, 8.5.2001, Ghahraman *et al.* 27410 (TUH); Tehran province, Karaj, Alborz Research Station, 1350 m, 2.4.1972, Mousavi 14899 (TARI).

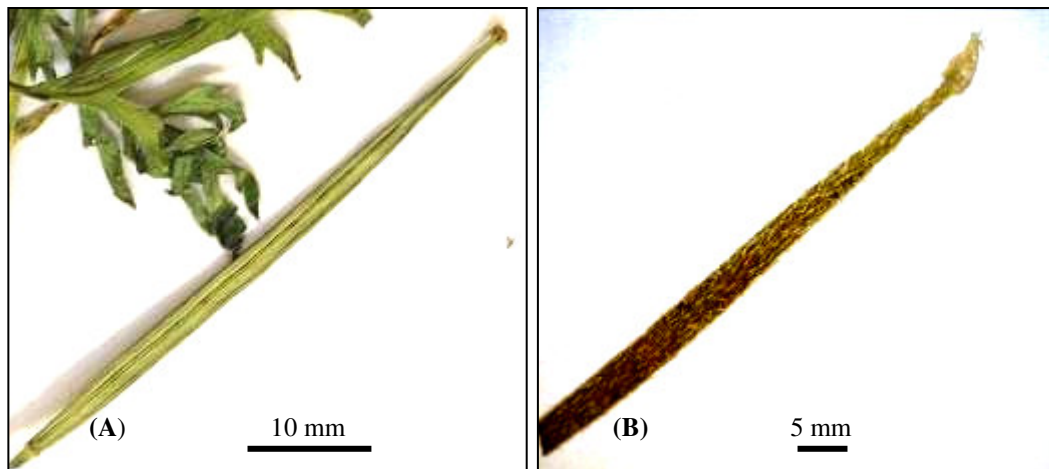


Fig. 1. *Roemeria refracta* fruit (siliqua): A. var. *refracta*, B. var. *trichocarpa*.

New variety

Roemeria refracta var. *alba* Tavakkoli & Assadi, var. nov.

(Fig. 2)

Type: Fars province, Marvdasht, Dorudzan dam, 1657 m, 4.4.2013, Zeraatkar 54321 (Holotype: FAR).

- Diagnosis

Differt a varietato typo petalis albis.

Petals white, with basal black spots. Ovary covered with dense adpressed hairs.

This variety occurs frequently together with the typical variety in a single population.

Roemeria hybrida (L.) DC., Veg. Syst. Nat. 2: 92 (1821)

Annual herbs; 4–30 cm high; stems hairy; hairs soft, bristly or rather bristly, sometimes crisped, patent or

occasionally adpressed. Leaves bi-tripinnate; ultimate lobes linear, linear-oblong, oblong, oblong-ovate or ovate. Pedicels 3–7.5 cm long, with soft or bristly and patent hairs. Buds obovate or narrowly obovate; calyx hairy. Petals 10–25 cm long, violet or sometimes pale red, with or without spot. Capsules cylindrical, 2–7 cm long, with bristly hairs 1–2 mm long and sometimes with short bristles or glabrous; hairs at the apex or base, in upper or lower parts or all along the capsule; dehiscent by 3 or 4 valves.

Geographical distribution: Europe, Turkey, Iran, Africa, Egypt, Jordan, Iraq, Syria, Afghanistan, Pakistan and Turkmenistan.

Identification key to the subspecies of *Roemeria hybrida* in Iran

1. Petals dark violet, without basal spot *R. hybrida* subsp. *hybrida*
 - Petals red, with basal black spot; spots with or without white margin *R. hybrida* subsp. *maculata*

Roemeria hybrida subsp. *hybrida*

= *R. dodecandra* Staph in Denkschr. Acad. Wien LI: 275 (1886) ≡ *R. hybrida* subsp. *dodecandra* (Forssk.) Maire in Jahandiez & Maire, Cat. Pl. Maroc. 2: 257 (1932) ≡ *R. hybrida* var. *hispidissima* Fedde in

Pflanzenr. 40 (4: 104) 1909-241; *R. latiloba* Hausskn. et Bornm. in Pflanzenr 40 (4: 104) 1909-242. syn. nov.

Petals dark violet; capsules hairy or glabrous.

Specimens examined: Golestan province, Gorgan, Jangal-e Golestan, Kuhha-ye Almeh, 1600 m, 28.4.1978, Daneshpajouh 58395 (38672-E) (IRAN);



Fig. 2. *Roemeria refracta* var. *alba*: A & D. Mature plant, B. Flower, C. Silique.

Azerbaijan province, Urumieh, Abegarm village, 9.5.1981, Tarighi & Farbodnia 1053 (TARI); Zanjan province, Qazvin to Zanjan, Agh-bolagh, 15.6.1960, Pabot 2850 (TARI); Kermanshah province, Polezahab, 8 km N. E. Polezahab, Brimavand village, 500–600 m, 18.4.1989, Hatami 2297 (TARI); Kermanshah, Parow mountain, above Bisotun, 1750–1900 m, 20.4.2001, Hamzehee & Asri 87863 (TARI); Esfahan province, Ardestan, Hambar, 1550 m, 17.4.1975, Foroughi 15987 (TARI); Fars province, Shiraz, Saadat Abad, 1190 m, 21.4.1972, Riazi 5745 (TARI); Khuzestan province, 20 km from Ramshir to Ramhormoz, 102 m, 15.5.2002, Ghahraman & Attar 28522 (TUH); Khorassan province, Shirvan, Loojali, 1400–1600 m, 16.6.2002, Djavadi & Sadeghi 58386 (IRAN); Tehran province, 50 km from

Tehran on the Saveh Road, 810 m, 5.5.1974, Dini & Bazargan 32320 (TARI).

Roemeria hybrida subsp. *hybrida* was not reported from Iran.

New subspecies

Roemeria hybrida subsp. *maculata* Tavakkoli & Assadi subsp. nov. (Fig. 3)

Type: Tehran province, Karaj, Hesarak, 1330 m, 15.5.2009, Karimi 54320 (Holotype: FAR).

- Diagnosis

Petala dilute rubra, maculis nigris basalibus praedita.



Fig. 3. *Roemeria hybrida* subsp. *maculata*: A. Mature plant, B. Flower, C. Siliqua.

Petals pale red, with basal black spots. Capsules with or without hairs.

Additional specimens examined: Azerbaijan (now Zanzan) province, Zanzan, 1600–1700 m, 10.5.1961, 54314 (FAR); Tehran province, Shahrestanak, on Chalus

road, 1900 m, 11.6.1972, Mousavi & Amin 14913 (FAR).

According to Cullen (1957) and Jafri & Quisar (1974), two subspecies belonging to *R. hybrida* (subsp. *hybrida* and *dodecandra*) characterized by leaf segments shape, capsule indumentum and dehiscing as following:

in *R. hybrida* subsp. *hybrida*: ultimate segments of leaves are linear in shape, capsules are 5–7 cm in length and partially setose only near the apex and dehiscing by three valves while in subsp. *dodecandra*: ultimate segments of leaves are ovate-oblong or linear-oblong to broad triangular in shape, capsules are 3–5.5 cm in length and with dense setae in all along the length or upper part and dehiscing by four valves. *R. latiloba* was also characterized by having leaf segments of oblong-ovate and glabrous capsules or sometimes hairy at the apex and four stigmatic rays (Fedde 1909).

Although many forms of the species and two subspecies mentioned are completely distinct but presence of a wide range of intermediate variants obscure taxonomic identification of the taxa. For instance, we

observed the individuals with linear leaf segments but with glabrous capsules and 3–4.5 cm in length and by dehiscing three valves or with setose capsules measuring 3–5 cm in length and by dehiscing 3 or 4 valves whereas the individuals were found with leaf segments of oblong to ovate but with capsules measuring 5–6.5 cm in length and setose and by three dehiscing valves. On the other hand, the accessions were seen with the bristles at the apex or whole length of capsules or with glabrous capsules in one specimen. Therefore, we regard the taxa of *R. latiloba*, *R. hybrida* subsp. *dodecandra* and *R. hybrida* var. *hispidissima* as synonyms of *R. hybrida* subsp. *hybrida*.

References

- Boissier, E. 1867. *Roemeria* Medic. Pp. 118–119. In: Flora Orientalis, Vol. 1. Genevae & Basileae.
- Carolan, J.C., Hook, I.I.I., Chase, M.W., Kadereit, J.W. & Hodkinson, T.R. 2006. Phylogenetics of *Papaver* genera based on DNA sequences from ITS nuclear ribosomal DNA and plastid *trnL* intron and *trnL-F* intergeneric spacers. *Annals of Botany* 98: 141–155.
- Cullen, J. 1957. *Roemeria* Medic. Pp. 791–794. In: Flora of Iraq, Vol. 4(2) (Townsend, C.C. & Guest, E. eds). Baghdad.
- Cullen, J. 1965. *Roemeria* Medic. Pp. 218–219. In: Flora of Turkey and the East Aegean Islands, Vol. 1 (Davis, P.H. ed.). Edinburgh. UK Edinburgh University Press.
- Cullen, J. 1966. *Roemeria* Medic. Pp. 7–9. In: Flora of Iranica, Vol. 34 (Rechinger, K.H. ed.). Akademische Druck-und Verlagsanstalt, Graz.
- Fedde, F. 1909. *Roemeria* Medic. Pp. 238–244. In: Das Pflanzenreich, Vol. 4(104) (Engler, A. ed.). Leipzig.
- Heydari Chaleshtori, Z. & Attar, F. 2012. Comparative of some selected species of the Poppy family (*Papaveraceae*) in Iran. *Taxonomy and Biosystematics* 3: 1–12.
- Jafri, S.M.H. & Quisar, M. 1974. *Roemeria* Medic. Pp. 4–7. In: Flora of West Pakistan, Vol. 62 (Nasir, E. ed.). Peshawar.
- Kadereit, J.W. 1986. Sectional affinities and geographical distribution in the genus *Papaver* L. (*Papaveraceae*). *Beiträge zur Biologie der Pflanzen* 63: 139–156.
- Kadereit, J.W. 1987. *Roemeria refracta* subsp. *occidentalis* Kadereit (*Papaveraceae*). *Flora* 179: 138.
- Kadereit, J.W. & Sytsma, K.J. 1992. Disassembling *Papaver*, a restriction site analysis of chloroplast DNA. *Nordic Journal of Botany* 12: 205–217.
- Kadereit, J.W., Schwarzbach, A.E. & Jork, K.B. 1977. The phylogeny of *Papaver* s. l. (*Papaveraceae*): polyphyly or monophyly *Plant Systematic and Evolution* 204: 75–98.
- Mowat, A.B. 1964. *Roemeria* Medic. Pp. 301. In: Flora Europaeae, Vol. 1 (Tutin, T.G., Burges, N.A., Chater, A.O., Edmondson, J.R., Heywood, V.H., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A. eds). Cambridge.
- Parsa, A. 1986. *Roemeria* Medic. Pp. 422–428. In: Flora of Iran, Vol. 2. Iran.
- Popov, M.G. 1937. *Roemeria* Medic. Pp. 455–456. In: Flora of the USSR, Vol. 7 (Sishkin, B.K. ed.). Izdatel' stvo Akademii Nauk SSSR, Moskva-Leningrad (English translation Jerusalem).