

ERODIUM GHAREMANII (GERANIACEAE), A NEW SPECIES FROM AZERBAIJAN PROVINCE, IRAN

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Among the herbarium specimens collected in Azerbaijan province, two specimens of an *Erodium* species seemed to be undescribed. The specimens were studied carefully and compared with other Iranian species and other neighboring countries, especially the perennials and it was discovered that the specimens in spite of a similar habit to *Erodium dimorphum*, have certain differences with it. The two new specimens are male and female of the same species. However, we came to the conclusion that the specimens are a new species and were named in honor of its collector M.A. Ghahremani. The new species and *E. dimorphum* have disjunct distribution in Semnan and Azerbaijan provinces respectively. The new species bears mixed simple and glandular hairs, stems ca. 30 cm high, leaves 15 cm long and 3 cm broad, leaflets lanceolate and 2-3 cm long. While *E. dimorphum* bears only simple hairs, no stem or stems up to 20 cm, leaves up to 12 cm long and 1 cm broad, and leaflets orbicular-ovate and up to 1 cm long.

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گونه جدید *Erodium ghahremanii* از تیره شمعدانی (Geraniaceae) از استان آذربایجان، ایران

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در بین نمونه‌هایی که از آذربایجان جمع‌آوری شده بودند، دو نمونه برای مدتی بدون نام باقی ماندند. در فرصت مناسب نمونه‌ها مطالعه و با بقیه گونه‌های ایرانی و کشورهای همجوار مقایسه شدند، علیرغم این که نمونه‌ها با گونه *Erodium dimorphum* در ظاهر شباهت دارند ولی در صفات اساسی بین آنها اختلافاتی وجود دارد. دو نمونه جمع‌آوری شده پایه‌های نر و ماده یک گونه تشخیص داده شدند و به عنوان گونه‌ای جدید به افتخار جمع‌آوری کننده آن نامگذاری شدند. گونه جدید با گونه وابسته خود به نام *E. dimorphum* در دو منطقه جغرافیایی جدا به ترتیب آذربایجان شرقی و سمنان انتشار دارند. در گونه جدید اغلب قسمت‌ها پوشیده از کرک‌های مخلوط ساده و غده‌ای است، ساقه به ارتفاع حدود ۳۰ سانتیمتر است، برگ‌ها به طول ۱۵ و عرض ۳ سانتیمتر است، برگچه‌ها سرنیزه‌ای و به طول ۲ تا ۳ سانتیمتر است. در صورتی که در گونه *E. dimorphum* پوشش کرکی فقط از نوع ساده است، ساقه وجود ندارد و یا ارتفاع آن به حداکثر تا ۲۰ سانتیمتر می‌رسد، برگها به طول تا ۱۲ و عرض ۱ سانتیمتر است و برگچه‌ها دایره‌ای تخم مرغی و به طول ۱ سانتیمتر است.

INTRODUCTION

The genus *Erodium* L' Hér. belongs to the family Geraniaceae and it consists of ca. 80 species worldwide (Albers & Van der Walt 2007). Schönbeck-Temesy (1970) recorded 15 species for the Flora Iranica area of which 13 were mentioned from Iran. Jani-Ghorban (2009) recorded 15 species from Iran. The genus has been divided into two sections *Barbata* and *Plumosa* by Boissier (1867). Schönbeck-Temesy (l.c.) also divided the genus into two sections including *Plumosa* Boiss. and *Erodium*. The latter section with 3 subsections. Recent authors divided the genus into two subgenera: *Erodium* and *Barbata* (Boiss.) Guitt. (Albers & Van der Walt 2007), each of them with some sections. In a phylogenetic study Omar, Vargas, Alarcon, and Aldansoro, J. J. (2006) confirmed the two subgenera *Erodium* and *Barbata* for the genus, the first subgenus with 2 sections and the later subgenus with 5 sections. Keshavarzi & al. (2017) studied pollen morphology of some of the species from Iran and they came to the conclusion that pollen characters partly confirm the subdivision of the genus *Erodium*.

Two *Erodium* specimens, collected from East Azerbaijan Province by Mr. Ghahremani were given to the first author for identification, but their identification remained unnamed for some years. Recently in a favorable time, the specimens were studied again and they looked similar to the specimens of *Erodium dimorphum* Wendelbo collected by the first author from the type locality. Worth mentioning is that type specimens of *E. dimorphum* are from high altitudes having no or short stems up to 3 cm but a recent collection from lower altitudes revealed that it could have stems up to 20 cm. However, the new collections have certain differences with *E. dimorphum*, and comparing them with other Iranian species and species from neighboring countries revealed that they have not been yet described. The description of the new species was prepared and sent to the second author from the herbarium of the Research Center of Agricultural and Natural Resources, East Azerbaijan province to check the new species and complete the description with duplicates of the type materials and other specimens of the new species preserved in their herbarium. Finally, we both came to the conclusion to describe the specimens as a new species. The aim of this paper is to introduce the new species.

MATERIAL AND METHOD

The specimens were collected from Mishu-Dagh Mountains, East Azerbaijan Province, Iran. Identification of the specimens was done by using

available and relevant literature (Janighorban 2009, Schönbeck-Temesy 1970, Bobrov and Vvedenski 1949). The specimens were compared with the materials in the TARI herbarium, especially specimens of a close relative, *E. dimorphum* collected from the type locality and the herbarium of the Research Center of Agricultural and Natural Resources, East Azerbaijan province. The measurements of the characters were prepared in the usual way by using binocular and a ruler. Ranges of the characters of the new species were prepared by the measurement of all available materials, but in the case of close relative measurements, the descriptions of accepted literature were also used. The line drawing was prepared by the artist in TARI herbarium. The type specimens are preserved in TARI herbarium and the herbarium of the Research Center of Agricultural and Natural Resources, East Azerbaijan Province.

RESULTS AND DISCUSSION

New species

Erodium ghahremanii Assadi & Fakhr-Ranjbari, **sp. nov.** (Figs. 1& 2)

Plant perennial, dioecious, ca. 35 cm high. Rhizome 2-4 cm long, divided, covered by remnants of basal leaf petioles, brownish. Basal leaves including petioles 10-18 cm long, deeply pinnatifid to pinnatisect, greenish yellow; petioles up to 8 cm long, with mixed glandular and eglandular spreading hairs; lateral lobes or leaflets 2-3 pairs, 2-3 cm long and up to 2 cm broad, broadly lanceolate, lobate-dentate, with rather sparse glandular and eglandular hairs, denser on the nerves; rachis partly winged by the continuation of leaflets and or lobes. Stems well branched; branches opposite. Stem leaves soon wilted; stipules ca. 1 cm long, triangular, acuminate, brownish; upper leaves similar to the basal leaves, but shorter and with short petioles. Male flowers: Peduncle up to 4 cm long, with glandular and eglandular hairs. Pedicels ca. 15 mm long, covered by glandular unequal hairs, curved downward. Sepals 5, ca. 8 mm long, oblong, covered by spreading glandular hairs, terminated at the apex to an awn ca. 3 mm long; outer sepals 5 and inner sepals 3 nerved. Nectaries 5. Petals white, 10 mm long and up to 6 mm broad, orbicular obovate, narrowed at the base to a short, bearded claw. Fertile stamens 5, somewhat shorter than the sepals, opposite to the sepals; anthers 1.5 mm long, yellow; staminodes 5, ca. 3 mm long, triangular lanceolate, acute. Gynoecium present but not developed. Female flowers: Peduncle up to 5 cm long, up to 5 flowered, covered with glandular hairs. Pedicels ca. 1 cm long, covered by glandular and eglandular hairs, curved downward.

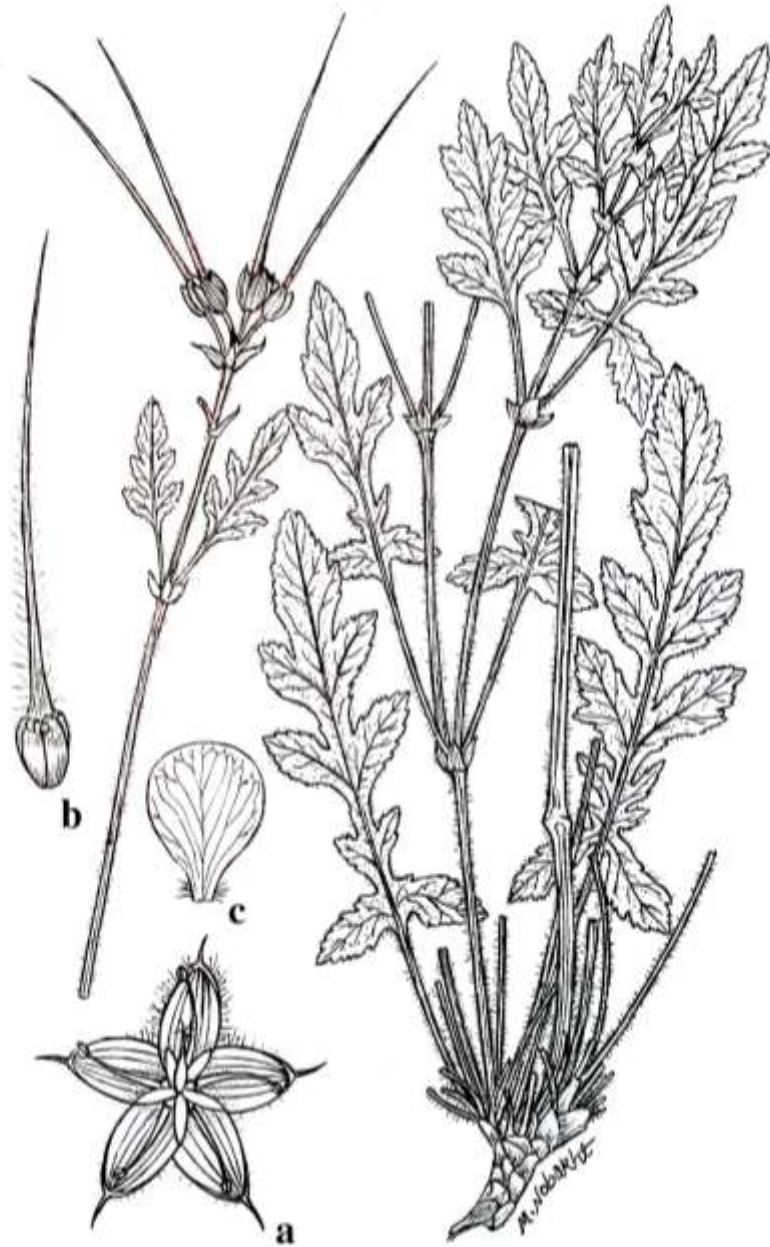


Fig. 1. *Erodium ghahremanii* ($\times 0.74$); a. male flower ($\times 2$); b. Fruit ($\times 1.1$); c. petal ($\times 2.6$).

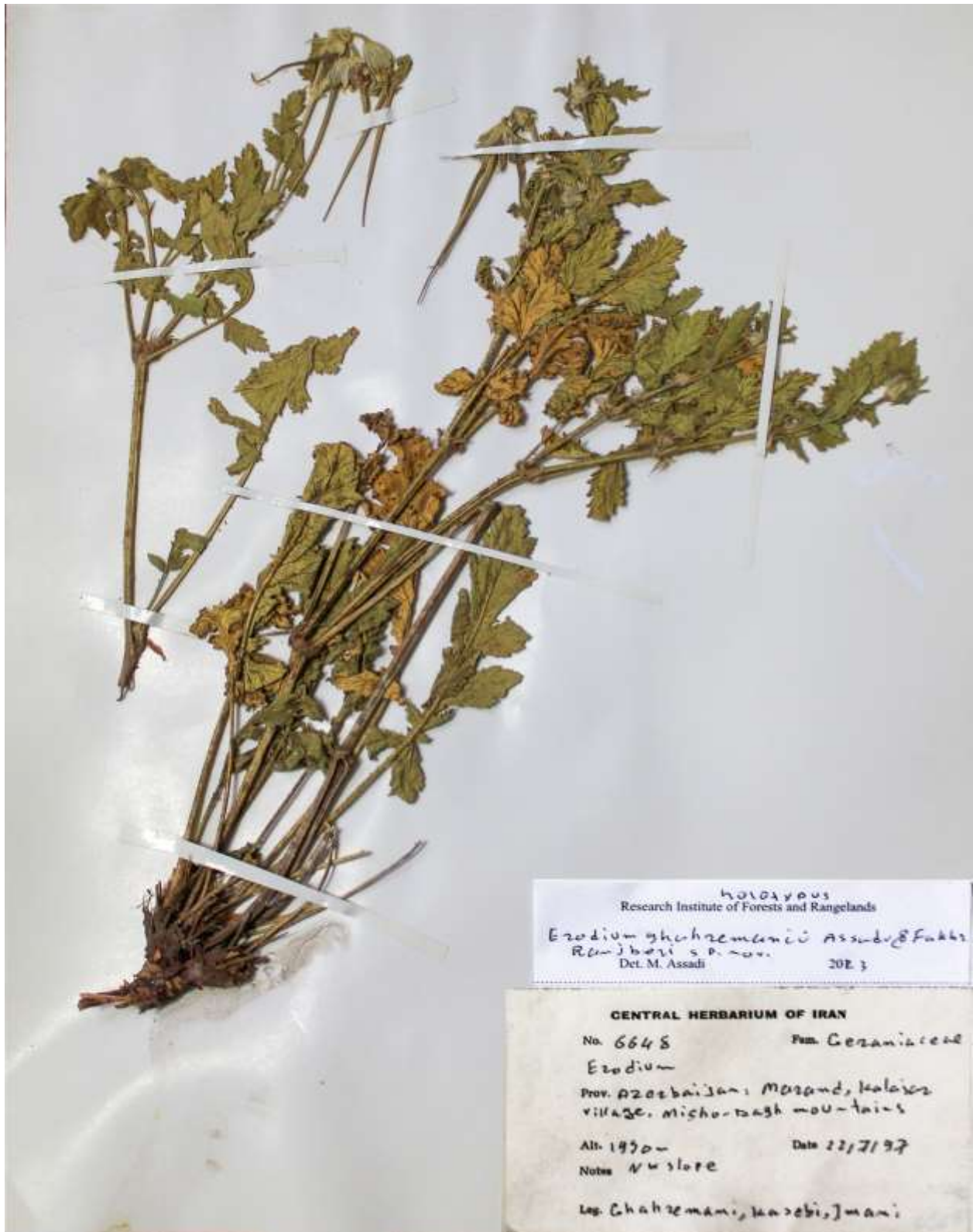


Fig. 2. *Erodium ghahremanii* (holotypus, female plant).

Sepals 11 mm long, elliptic, terminated to an awn ca. 3 mm long at the apex, covered by unequal glandular and eglandular hairs; outer sepals 7 and inner sepals 5 nerved. Petals similar to male flowers. Stamens sterile, 6 mm long; filaments broadly winged in lower half, ciliate; anthers reduced. Fruit ca. 10 mm long and 5 mm broad, narrowed toward the base, brownish, covered by long eglandular and short glandular hairs; mericarps with apical rounded pits; beak up to 6 cm long, covered by glandular and less eglandular erect hairs.

Typus: Iran, East Azerbaijan, Marand, Kalajar village, Mishu-Dagh Mountains, NW. and N. slopes, 1950 m, 22.07. 1997, M. A. Ghahremani, Kasebi and Imani 6648 (holotypus TARI; isotypus, E Azerbaijan Research Centre of Agricultural and Natural Resources herbarium).

Other specimens examined: *Erodium ghahremanii*, Azerbaijan: Marand, Kalajar village, Mishu-Dagh Mountains, 2215 m, 29.06.1997, Ghahremani & Kasebi 6602; *Erodium dimorphum*, Semnan: 31 km from Firouzkuh to Semnan, 2600 m, 26.07. 1902 Assadi & Mozaffarian 40333; N of Semnan, Kuhe Nazva (locus classicus), 3500 m, very rare, 23.07.2001, Assadi & Ranjbar 82086.

Relationships: The specimens bear persistent beaks and two pits at the apex of the fruit and therefore belong to the subgenus *barbata* (Boiss.) Guitt. Perennial habit, pinnatisect to pinnatifid leaves, winged rachis leaves, and fruit with a 6 cm long beak put the new species in the section *Absinthoidea* (Brumhard) Guitt. However, the new species is a close relative of *Erodium dimorphum* Wendelbo described and known by now from a single locality in Semnan province but differs from it by the following characteristics: Stems well developed and up to 35 cm high (not stem less as the type of *E. dimorphum* in higher altitudes or with a stem up to 20 cm as the specimens from lower altitudes), the whole plant covered by glandular and eglandular hairs (not only eglandular hairs). Basal leaves ca. 15×3 cm and greenish yellow (not up to 12×1 cm and not greenish-yellow but greyish), leaflets elongated, lanceolate, 2-3 cm long, up to 2 cm broad and with scattered glandular and eglandular hairs, but in *E. dimorphum* leaflets are 1 cm long, orbicular ovate and densely covered by short simple hairs. Another relative could be *E. amanum* Boiss. & Kotschy an endemic Turkish species (Davis 1967), that differs from the new species by having 2-3 pinnatisect basal leaves (not simply pinnatisect), prostrate or ascending stems ca. 8 cm long (not rigid upright stems to 35 cm).

It should be noted that *E. dimorphum* was described from Semnan Province in the crevices of rocks of Kuhe Nizva as a stemless plant with a stem of up to 3 cm long. Later in the same locality plants similar to the type

specimen were collected by Assadi & Ranjbar 82086 in a locality rather close to the type but with a lower altitude ca. 2600 m collected by Assadi & Mozaffarian 40333. This specimen bears all the characters including the indumentum of *E. dimorphum* but all sizes are larger and well stemmed ca. 20 cm high. However, the new species with the larger size and shape of organs, and indumentum is quite different.

Etymology: The epithet of the species is in honor of Mr. Mohammad Ali Ghahremani, the collector of the type specimen and a well-known collector in E Azerbaijan Province.

Distribution and habitat: *Erodium ghahremanii* is known from the northern slopes of the Misho Dagh in East Azerbaijan Province from altitudes of 1700–2050 m. The new species is adapted to clay loam and sandy loam soils and steep slope inclination (60-65 degrees). The vegetation cover is 35-50%. Some plants that were present in the same area along with *Erodium ghahremanii* are as follows: *Cirsium yamense*, *Galium incanum*, *Astragalus aureus*, *Stachys inflata*, *Thymus kotschyanus*, *Crucianella gilanica*, *Ziziphora clinopodioides*, *Melica jaquemontii*, *Nepeta fissa*, *Silene spergulifolia*, *Secale montanum*, *Helichrysum globiferum*, *Papaver armeniacum*.

Conservation status and threats: *Erodium ghahremanii* is native to Misho Dagh, with a known extent of occurrence and area of occupancy of 0.05 km². According to the limited AOO < 10 km² and known to exist at only a single location, area, and quality of habitat, the species is assessed as critically endangered. The species occurs in the margin of fields, agricultural land, and near seasonal rivers. The main threats are habitat destruction and land use change.

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