

A new genus and three new species from Central Anatolia, Turkey

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Abstract: A new genus (*Pseudodelphinium* H.Duman, Vural, Aytaç & Adıgüzel) and 3 new species (*Pseudodelphinium turcicum* H.Duman, Vural, Aytaç & Adıgüzel; *Iberis halophila* Vural & H.Duman; and *Frankenia salsuginea* Adıgüzel & Aytaç) from the Tuz Gölü (Salt Lake) basin (Central Anatolia) are described. Illustrations, ecological habit, and a distribution map are given. The relationships of the new genus and species are discussed in terms of related taxa.

Key words: *Pseudodelphinium*, Ranunculaceae, *Iberis*, *Frankenia*, Salt Lake, Turkey

Introduction

The Tuz Gölü (Salt Lake) basin is one of the most interesting floristic regions in Turkey. Halophytic vegetation is common in this region, including many threatened local endemic plant species (Ekim et al., 2000), such as *Silene salsuginea* Hub.-Mor. (Coode & Cullen, 1967), *Kalidium wagenitzii* (Aellen) Freitag & G.Kadereit (Freitag & G.Kadereit 2006), *Salsola stenoptera* Wagenitz and *S. anatolica* Aellen (Aellen, 1967b), *Onosma halophilum* Boiss. & Heldr. (Reidl, 1978), *Salvia halophila* Hedge (Hedge, 1982), *Allium vuralii* Kit Tan (Davis, 1988), and *Dianthus aydogdui* Y.Menemen & E.Hamzaoglu (Menemen & Hamzaoglu 2000). Recently, 9 new species (*Saponaria karapinarensis* Vural & Adıgüzel, *Senecio salsuginea* H.Duman & Vural, *Centaurea tuzgoluensis* Aytaç & H.Duman (Vural et al., 2006), *Taraxacum tuzgoluensis* Yild. & Doğ.-Koc. (Yıldırımli & Doğru-Koca, 2005), *Astragalus demirizii* R.Kramer & Podlech (Podlech D., 1999), *Linum ertugrulii* Tugay, Bağcı & Uysal (Tugay et al., 2010), *Limonium adilgunerii*

Yild. & Doğ.-Koc. (Yıldırımli & Doğru-Koca, 2006), *Acanthalimon halophilum* var *coloratum* Doğan & Akaydın (Doğan & Akaydın, 2007) and *Scorzonera tuzgoluensis* Doğan, A.Duran & Makbul (Doğan et al., 2010) were described from the same area.

During excursions to Tuz Gölü basin between 1997 and 1999, the authors collected 3 halophytically interesting specimens. The first one, with small and unusual habitus, belongs to Ranunculaceae and its habit is superficially similar to that of annual *Delphinium* L. (Tamura, 1993) but some characters of flowers are very distinct from those of *Delphinium*, e.g., flowers actinomorphic, perianth uniseriate, sepal absent, petals similar, and spur absent. The second one is a halophytic *Iberis* L. with fleshy spatulate to oblanceolate leaves. The last one is also a halophytic *Frankenia* L. with semifleshy leaves and creeping prostrate stems rooting at nodes.

These 3 specimens were cross-checked with related floras, such as *Flora of Turkey* (Davis, 1965; Cullen, 1967), *Flora Europaea* (Tutin & Heywood,

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1964, 1981), *Flora Palaestina* (Zohary 1966, 1987), *Flora Iraq* (Hedge 1980), Check-List of Additional Taxa to the Supplement Flora of Turkey V (Özhatay & Kültür, 2011), and *The Families and Genera of Vascular Plants* (Kubitzki et al., 1993), and the herbaria of GAZI, ANK, HUB, E, and K, and we decided that the 3 different specimens were 3 new species. One of them also belongs to the undescribed new genus *Pseudodelphinium*. Authorities of all cited plant names are given according to *Authors of Plant Names* (Brummitt & Powell, 1992).

Pseudodelphinium H.Duman, Vural, Aytaç & Adıgüzel **genus nova**

Typus. *Pseudodelphinium turcicum* H.Duman, Vural, Aytaç & Adıgüzel

Affinis *Delphinium* L. sed floribus actinomorphis (non zygomorphis), perianthiis uniseriatis (non biseriatis), petalis 5, similibus (non 4 et dissimilibus), caldari absentis (non prasentis) differt.

Glaucous, virgate, rigid annual, (3-)10-20(-25) cm tall. Stem simple or branched above, terete, striate, shortly crisped-pubescent throughout. Basal leaves withered at flowering time; median cauline leaves shortly petiolate (to 7 mm), cuneate, divided with 3 linear-lanceolate to narrowly elliptic segments up to 8 × 3 mm or simple, linear, lanceolate to narrowly elliptic, to 20 × 5 mm; upper cauline leaves entire, linear-oblong to narrowly elliptic, reducing upward; all leaves acute, crisped-hairy. Racemes 3-12-flowered, up to 5 cm long, crisped-pubescent; bracts similar to upper leaves, but smaller, equal or longer than the pedicels; bracteoles similar to bracts, placed just below the ovary, shorter, equal, or longer than the flowers; pedicels 2-7 mm, closely adpressed to the flowering axis, distinctly thickened above. Flowers actinomorphic, hermaphrodite. Perianth uniseriate. Sepal absent. Petals 5, free, violet, purple to greenish yellow, lanceolate to oblong or oblanceolate, 5-9 × 2.5-3 mm, sometimes slightly hooded, acute, dorsal surfaces crisped-pubescent. Nectary absent. Stamens numerous (12-18), spirally arranged in rows, the filaments dilated lower half; lower half densely glandular papillate, upper glabrous; anthers yellow, c. 1 mm. Follicles 3, densely spreading pilose, greenish, 5-8 × 2 mm, longitudinally striate; style 1.5-2 mm, glabrous. Seeds 8-10 in each follicle, c. 2 mm, blackish, subglobose with a large ventral orifice, 5-8

continuous rings of transversal concrescent scales, umbilical orifice occupying 1/2-1/3 of the total seed volume.

Fl. and Fr. 6-7.

Pseudodelphinium turcicum H.Duman, Vural, Aytaç & Adıgüzel, **sp. nova** (Figures 1-2).

Type: Turkey, C4 Konya: Karapınar to Konya road, 30 km, Merdivenli village, 1020 m, dry plain steppes, growing with *Peganum harmala* communities, 28.7.1998, H.Duman 6824 & Z.Aytaç (holotype: GAZI, isotypes: ANK, HUB).

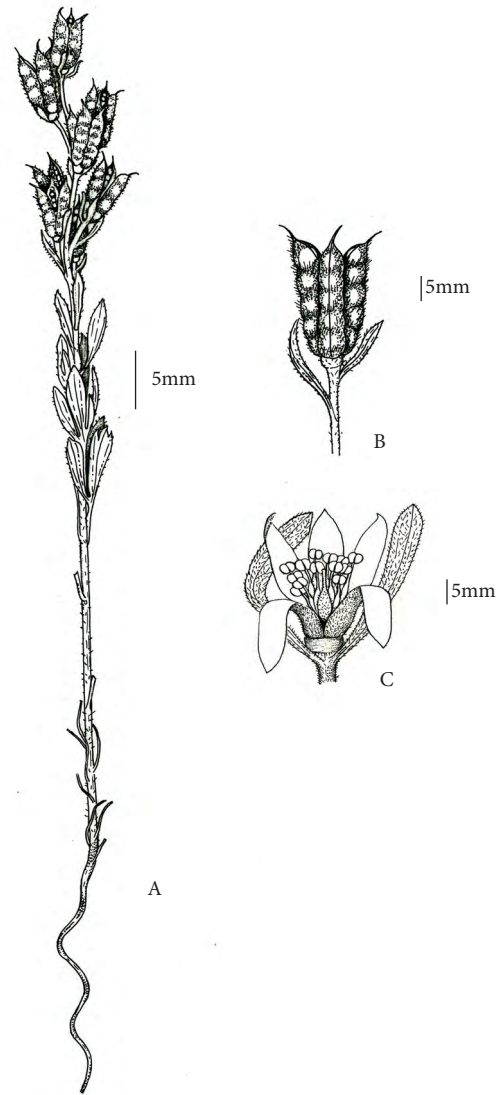


Figure 1. *Pseudodelphinium turcicum*. A- habitus, B- follicle, C- flower.



Figure 2. *Pseudodelphinium turcicum* in the field.

Examined specimens (Paratypes): C4 Konya: Karapınar to Konya road, 30 km, Merdivenli village, 1020 m, dry plain steppes, with *Peganum harmala* communities, 24.06.1997, M.Vural 7793, H.Duman & Z.Aytaç (GAZI, KNYA). *ibid.*, 24.06.1999, Z.Aytaç 7900, H.Duman & M.Ekici (GAZI).

Description as the genus.

Similar to *Delphinium* L., but flowers actinomorphic (not zygomorphic), perianth uniseriate (not biseriata), sepals absent (not present), petals 5, similar (not 4 and dissimilar) spur absent (not present). Otherwise, it is closed to the genus *Garidella* L., which is distributed in S Europe, and SW and C Asia. It is represented by 2 species in the world (Kubitzki et al., 1993). *Garidella* has 5 sepals, but hardly petaloid and 5 petals, biseriata (longer than sepals). This new genus has 5 petals (not 5 sepals and 5 petals) and uniseriate. The genus *Garidella* is placed in the tribe *Nigelleae* Langent & Tamura, while the genus *Delphinium* L. is placed in the tribe *Delphinieae* Warm. The genus *Pseudodelphinium* is placed within these 2 tribes. After detailed study, a new tribe may be suggested for the monotypic genus *Pseudodelphinium*.

Endemic. Ir.-Tur. element.

Recommended IUCN threat category listing:

It is known from one locality (criterion B2 a), with an estimated area of occupancy of less than 5 km² (criterion B2a). The population is endangered, with

less than 100 individuals (criterion C). Therefore, it should be classified as “Critically Endangered (CR B2a:C)” based on the criteria of the IUCN Red List Categories (IUCN, 2001).

Distribution and ecology: A very rare endemic restricted to Karapınar District (Konya Province). This new species occurs in sandy places of the ancient lake basin in Inner Anatolia steppes and grows with *Peganum harmala* L, *Cousinia iconica* Hub.-Mor. *Astragalus tribuloides* Delile, *Erysimum crassipes* Fisch. et C.A.Mey., *Heliotropium lasiocarpum* Fisch. et C.A.Mey., *Stipa holosericea* Trin, and *Astragalus karamasicus* Boiss. et Balansa.

***Iberis halophila* Vural & H. Duman sp. nova** (Figures 3, 4).

Type: Turkey, B4 Konya: Cihanbeyli, Gölyazı to Günyüzü (Tersakan Gölü), 1000 m, salt steppes, 03.06.1999, M.Vural 8200 (holotype: GAZI, isotypes: ANK, HUB).

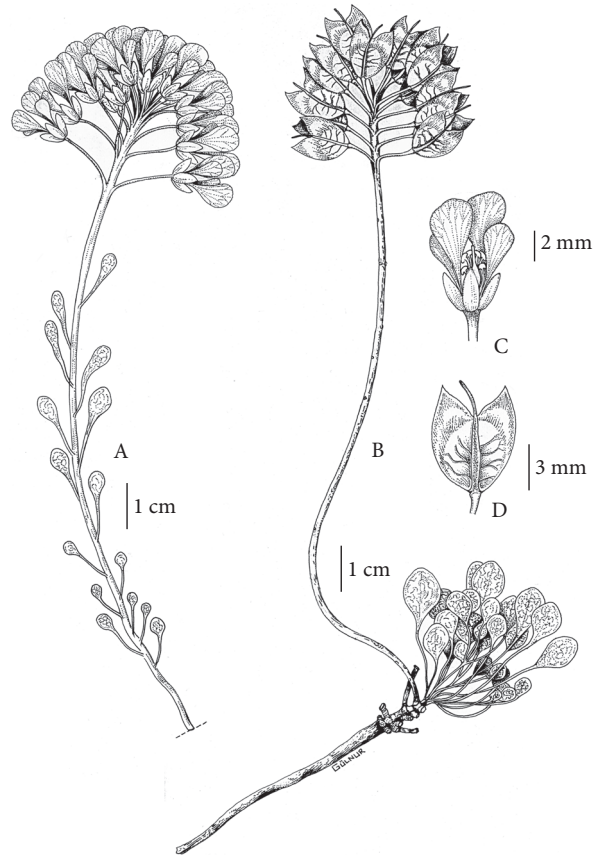


Figure 3. *Iberis halophila*. A and B- habitus, C- flower, D- siliqua.



Figure 4 - *Iberis halophila* in the field.

Examined specimens (Paratypes): B4 Aksaray: Eskil-Yenikent, 4 km east of Eskil, 950 m, salt steppes, 09.10.1998, *M.Vural* 8169 & *H.Duman* (GAZI, ANK, HUB); *ibid.*, 940 m, 05.07.1998, *M.Aydođdu* 3856 (GAZI); *ibid.*, 24.06.1999, *Z.Aytaç* 7909, *H.Duman* & *M.Ekici* (GAZI); *ibid.*, 2 km east of Eskil, 980 m, 03.06.1999, *M.Vural* 8195 (GAZI, ANK); B4 Konya: Cihanbeyli, Göllyazı to Günyüzü (Tersakan Gölü), 930 m, salt steppes, 29.07.1998, *H.Duman* 6832 & *Z.Aytaç* (ANK, HUB).

Affinis *I. spruneri*, sed planta perenni (non annua et bienni), foliis valde carnose, petiolis distinctis; pedicellis brevissimis, 4-5 mm (non 5-12 mm) differt.

Perennial herb with woody at base, glabrous. Stems (2-)4-8(-13) cm long, branched at base, ascending to erect. Lower leaves spatulate to oblanceolate, distinctly petiolate; petioles to 1.2 cm; lamina orbicular 3-7 × 3-7 mm, very fleshy. Cauline leaves similar to basal leaves, but smaller. Inflorescence ± corymbose, not elongate in fruit, 10-20-flowered. Sepals oblong to obovate, 2.5-3 mm, not saccate, violate, membranaceous-margined. Petals white to pinkish-violate, distinctly clawed; other 2 larger than inner, 6-7 × 2.5-3 mm; inner 3.5-4 × 1.5-2 mm. Fruiting pedicels horizontal to reflexed, 4-5 mm. Fruit ovate to orbicular, 5-8 × 4-7 mm, rounded at base, apex with 2 acute pointed wings; sinus broad, 1-2 mm; wings 1-2.5 mm, septum 4-6 × 1 mm; style 1-2 mm. Seed 2, mucilaginous, c. 3 × 2 mm, brownish.

Fl. and Fr. 6-7.

This new species is similar to *Iberis spruneri* Jord., (Hedge, 1965), which is distributed in West and South Anatolia, but it is perennial (not annual to biennial), leaves fleshy, petioles distinct and fruiting pedicels shorter, 4-5 mm (not 5-12 mm).

Endemic. Ir.-Tur. element.

Recommended IUCN threat category listing: It is known from one locality (criterion B2 a), with an estimated area of occupancy of less than 5 km² (criterion B2). The population is endangered, with less than 100 individuals (criterion C). Therefore, it should be classified as “Critically Endangered (CR B2a C)” based on the criteria of the IUCN Red List Categories (IUCN, 2001).

Distribution and ecology: A rare endemic to Central Turkey (a small area of SW and W of Tuz Gölü). *Iberis halophila* occurs on *Juncus maritimus* Lam. salt marshy areas, which occur in summer, and grows with endemic taxa like *Taraxacum mirabile* Wagenitz, *Allium vuralii* Kit Tan, *Centaurea tuzgoluensis* Aytaç & H.Duman, *Senecio salsuginea* H.Duman & Vural, *Silene salsuginea* Hub.-Mor, *Gladiolus halophilus* Boiss. & Heldr, *Puccinellia bulbosa* (Grosh.) Grosh. subsp. *caesarea* Kit Tan, *Salsola stenoptera* Wagenitz, *Verbascum pyroliforme* (Boiss. & Heldr.) Hub.-Mor, *Salvia halophila* Hedge, *Hypericum salsugineum* Robson & Hub.-Mor, and *Onopordum davisii* Rech. fil., and nonendemics such as *Thymus sipyleus* Boiss. var. *sipyleus*, *Halocnemum strobilaceum* (Pall.) M.Bieb., *Linum seljukorum* P.H. Davis, *Puccinellia convoluta* (Hornem.) P.Fourr., *Inula aucherana* DC., and *Plantago crassifolia* Forsskal.

***Frankenia salsuginea* Adıgüzel & Aytaç sp. nova** (Figures 5-6).

Type: Turkey, B4 Aksaray: Cihanbeyli, Göllyazı to Günyüzü (Tersakan Gölü), 1000 m, salt steppes, 03.06.1999, *M.Vural* 8199 (holotype: GAZI, isotypes: ANK, HUB).

Examined specimens (Paratypes): Turkey, B4 Aksaray: Cihanbeyli, Göllyazı to Günyüzü (Tersakan Gölü), 930 m, salt steppes, 25.09.1996, *M.Vural* 7719, *H.Duman* & *N.Adıgüzel* (GAZI, ANK, HUB); *ibid.*, *A.Güner* 12688, *H.Duman*, *M.Vural* & *T.Ekim* (GAZI).

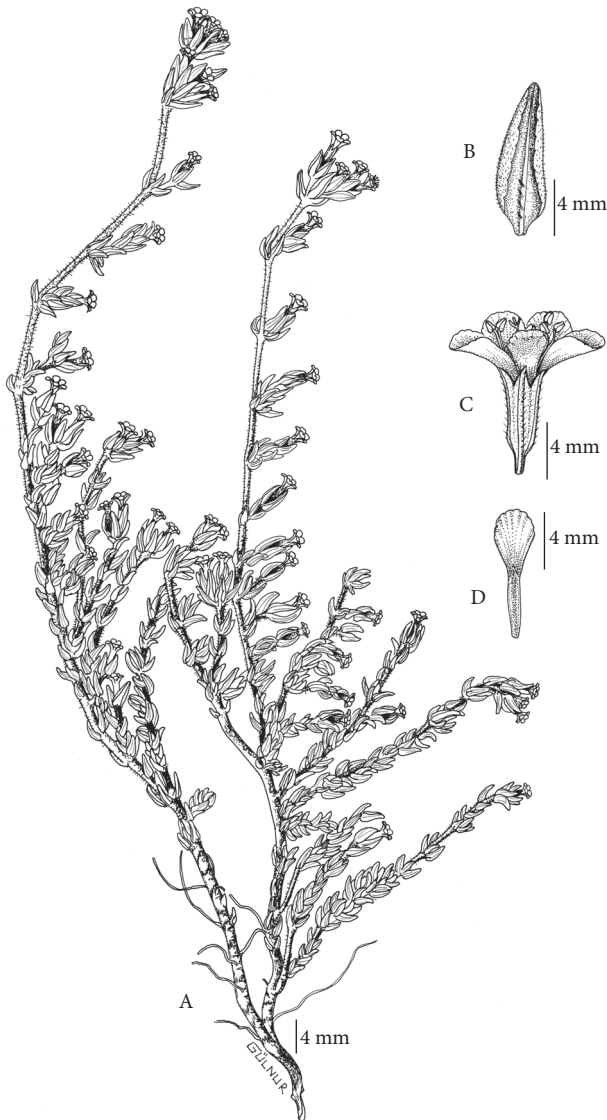


Figure 5. *Frankenia salsuginea* A- habitus, B- leaf, C- flower, D- petal.

Affinis *Frankenia hirsutae* L. sed caulibus prostratis, repentibus ad nodis, radicanibus (non erecto-prostratis), foliis ovato-lanceolatis, $1.5-2.5 \times 1-1.2$ mm, valde revolutis [non anguite elliptico-linearibus et $2-8(-12) \times 0.5-4$ mm], calycis dentibus marginibus glabris (non minute ciliatis) differt.

Perennial, producing long leafy creeping prostrate stolon, rooting at nodes. Stem much branched; branches 1-5 cm long, terete, \pm densely puberulous to crispy tomentose. Leaves thick, somewhat fleshy, shortly petiolate or sessile; petioles with few long ciliate; lamina ovate-lanceolate, $1.5-2.5 \times 1-1.2$ mm,



Figure 6. *Frankenia salsuginea* in the field.

strongly revolute, densely white minutely crisped-pubescent and with a white crust below, glabrescent or with a white crust above. Flowers sessile in dichasial leafy cymes or solitary. Calyx narrowly oblong, 4-5 mm, sessile, glabrous and with a white crust or minutely crisped-pubescent below, reddish, with 5 prominent rounded ribs; teeth triangular-lanceolate, apiculate at apex, 0.7-1.5 mm long, glabrous. Petals pink or purple, drying yellowish, 7-9 mm long; lamina narrowly or broadly cuneate-obovate and narrowed into a long claw, apex of lamina rounded, irregularly dentate, appendage triangular, c. 0.5 mm. Stamens 6, shorter than petals; filaments linear, glabrous; anther yellow, 0.8-1 mm long. Style trifid; stigmas linear-clavate. Capsule 2.5-3 mm long, including in calyx. Seed ovoid-fusiform, 1-1.5 mm long, shortly crisped-pubescent to papillose.

Fl. 6-7; Fr. 8-9.

This new species is similar to *Frankenia hirsuta* L., which is widely distributed in Turkey, but *F. salsuginea* is restricted to Tuz Gölü basin. *F. salsuginea* has creeping prostrate stem rooting at nodes while *F. hirsuta* is distinguished with erect to prostrate unrooted stem at nodes, ovate-lanceolate and strongly revolute leaves, $1.5-2.5 \times 1-1.2$ mm [not narrowly elliptic to linear, $2-8(-12) \times 0.5-4$ mm] and has glabrous teeth of calyx margin glabrous (not ciliate as *F. hirsuta*).

Endemic. Ir.-Tur. element.

Recommended IUCN threat category listing: It is known from one locality (criterion B2 a), with

an estimated area of occupancy of less than 5 km² (criterion B2). Therefore, it should be classified as “Critically Endangered (CR B2a: C)” based on the criteria of the IUCN Red List Categories (IUCN, 2001).

Distribution and ecology: An endemic to Central Turkey (a small area SW and W of Tuz Gölü). *Frankenia salsuginea* occurs on alkaline salty steppes, which are dry in summer, and grows with many endemic taxa such as *Kalidium wagenitzii* (Aellen) Freitag & G.Kadereit, *Taraxacum mirabile* Wagenitz, *Allium vuralii* Kit Tan, *Centaurea tuzgoluensis* Aytaç & H.Duman, *Senecio salsuginea* H.Duman & Vural, *Onopordum davisii* Rech. Fil., *Onosma halophilum* Boiss. & Heldr., *Silene salsuginea* Hub.-Mor., *Gladiolus halophilus* Boiss. & Heldr., *Salsola stenoptera* Wagenitz, *Verbascum pyroliforme* (Boiss. & Heldr.) Hub.-Mor., *Salvia halophila* Hedge, and

Hypericum salsugineum Robson & Hub.-Mor., and nonendemics like *Noaea minuta* Boiss. & Balansa, *Petrosimonia brachiata* (Pallas) Bunge, *Linum seljukorum* P.H.Davis, *Halocnemum strobilaceum* (Pall.) M.Bieb., *Puccinellia convoluta* (Hornem.) P.Fourr., *Inula aucherana* DC., and *Plantago crassifolia* Forsskal (Figure 7).

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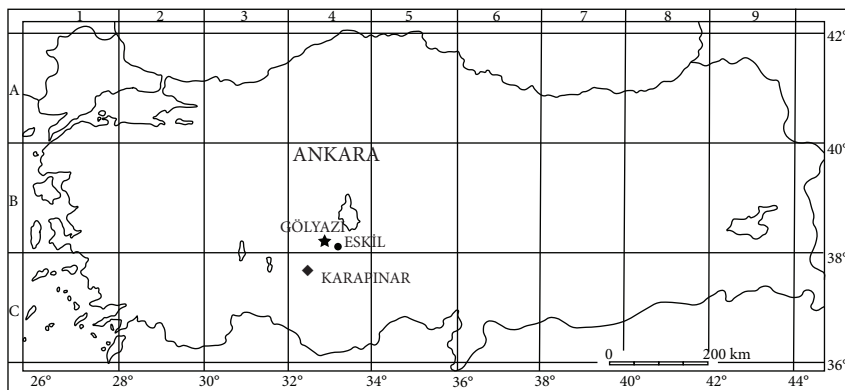


Figure 7. Distribution of the new species in Turkey. *Pseudodelphinium turcicum* (◆), *Iberis halophila* (*), *Frankenia salsuginea* (●).

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