



Original Article

Morphological features and conservation Status of Caryophyllaceae family in the Garmian region of Kurdistan, Iraq

Ahmed Habeeb Hameed * ¹, Saman Abdulrahman Ahmad ²

¹ Department of Biology, College of Education, University of Garmian, Kalar 46021, Al Sulaymaniyah, Kurdistan Reign, Iraq.

² Department of Biotechnology and Crop Science, College of Agricultural Engineering Sciences, University of Sulaimani, Al Sulaymaniyah 46001, Kurdistan Reign, Iraq.

Received 26 January 2026; revised 25 February 2026;
accepted 09 March 2026; available online 07 July 2026

DOI: [10.24271/psr.2026.502212.1915](https://doi.org/10.24271/psr.2026.502212.1915)

ABSTRACT

This study was conducted from 2021 to 2024 in the Garmian region of Kurdistan, Iraq, to examine the morphological characteristics and conservation status of the Caryophyllaceae family. The study recorded 21 species across 10 genera. The identified genera are *Arenaria* (two species), *Cerastium* (one species), *Dianthus* (four species), *Gypsophila* (one species), *Herniaria* (one species), *Mesostemma* (one species), *Silene* (eight species), *Stellaria* (one species), *Vaccaria* (one species), and *Velesia* (one species). The results underscore the variety of the Caryophyllaceae family in the area, with *Silene* representing the most species-rich genus. The study evaluated the conservation status of these species, offering critical insights into their ecological importance and the necessity for conservation initiatives in the Garmian region. This study enhances the comprehension of plant variety in Kurdistan, Iraq and emphasises the necessity of conserving its distinctive flora.

<https://creativecommons.org/licenses/by-nc/4.0/>

Keywords: Caryophyllaceae family, conservation status, flora, Garmian area, morphological characteristics, flora.

1 Introduction

The Garmian region is one of the largest and most important botanical areas in Kurdistan Iraq, and the Irano-Turanian region. It's part of the extensive Zagros Mountain steppe ecoregion ^[1]; or, as described by another research ^[2], this area is identified as part of the Kurdo-Zagrosian system. A rich biodiversity and unique ecological features mark it. It nestled near the Zagros Mountains, which form a natural barrier along the Persian frontier. The region of Garmian in Kurdistan, Iraq, is surrounded by a variety of topographic features, such as the foothills of the Persian borders to the east, Bamo Mountain to the northeast, and Garmian lands to the south and southwest. The Sirwan River flows through the region from north to south. This region is located where three different botanical districts in Iraq—Persian Foothills District (FPF), Kirkuk District (FKI), and Sulaimani District (MSU)—converge ^[1].

The diverse climate and altitude across these districts contribute to a remarkable tapestry of plant species, making Garmian an essential area for botanical study. Floristic studies play a crucial role in managing and protecting vegetation reserves. By

documenting plant species diversity, these studies help identify key habitats and assess ecosystem health ^[3]. One of the most important plant families in the world is Caryophyllaceae Juss. It belongs to the Caryophyllales tribe ^[4], which has 100 genera and 3000 species spread across the northern hemisphere, the Mediterranean, and the Irano-Turanian region ^[5, 6, 7]. solely 24 genera and 135 species were distributed in the different areas of Iraq ^[8, 9, 10, 11, 12, 13], and many floristic studies have been conducted previously in Kurdistan Iraq; for example, Ahmad ^[14] studied the wild vascular plants of Hawraman mountain and found fifteen genera and fifty-five species of Caryophyllaceae. Additionally, a thorough floristic study on the Qaradagh mountain ^[5], and it found fourteen genera and thirty-seven species of Caryophyllaceae. In addition, also Hama ^[16] documented 16 genera and 38 plant species during her study on vascular plants at Mount Gmo in Sulaimani Governorate. In a different study into the vascular plants of Mount Makok, conducted by Siddiq (2023), a total of seven genera and ten species were identified ^[17].

The Garmian region, which contains a range of topographical and climatic zones, is home to ten genera and twenty species of plants. As a result, it is one of the most important unexplored regions, abundant in plant diversity, and a major contribution to Iraq's flora. The current study provides information on habitat, occurrence, and conservation status in Kurdistan, Iraq, as well as new locations for the various taxa and the distribution range of

* Corresponding author

E-mail address ahmed.habeeb@garmian.edu.krd (Instructor).

Peer-reviewed under the responsibility of the University of Garmian.

the majority of the species. This study's main goal is to do a thorough morphological characterisation of Caryophyllaceae species that are found in Iraq's Garmian region. This survey aims to establish a thorough baseline for these species' identification, classification, and comprehension of their ecological roles in the area by recording and examining their unique physical characteristics. By providing insightful information for upcoming research on plant taxonomy, conservation, and the sustainable use of regional flora, this study also seeks to close a gap in the current botanical knowledge of the Garmian region.

2 Material and method.

2.1 Location of study area

The Garmian area is situated in Kurdistan, Iraq, located southeast of the Sulaymani governorate. This area extends along the Persian

frontier 126 km southeast and south of the Sulaymani governorate and occupies an area of about 2981.31 km² [1, 18]. Garmian is located between 34°25'28" N to 35°08'12" N and 44°51'24" E to 45°53'51" E. The altitudes of the studied area range from a low of 141 meters near the Kalar district to a high of 1,802 meters at the Peak of Bamo Mountain. The proposed area includes several mountains to the northeast of the study region, forming the border with Iran. Much of this land consists of foothills extending from Bawanur to Darbandikhan and the foothills along the Iranian border. Garmian shares approximately 148.17 km of its border with Iran. The most significant part of Garmian is characterised by a steppe plain, particularly in the central and southern regions of the study area. The Sirwan River tributaries flow through this area from north to south, covering about 117.91 km. The total area of the study region is approximately 2981.31 km² (Figure 1).

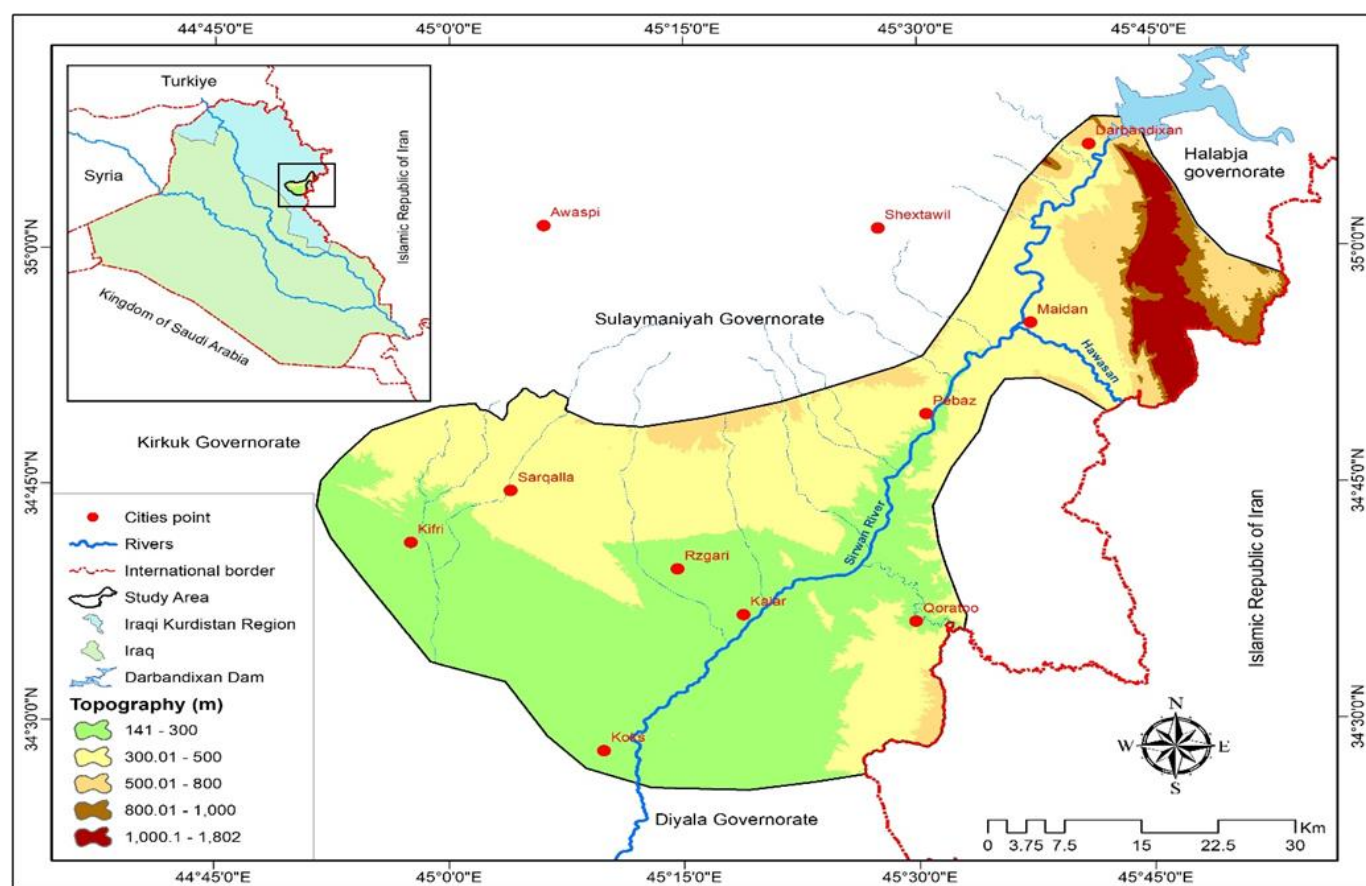


Figure 1: Location of the Study area.

2.2 Materials

This study was conducted from 2021–2024 to identify and characterise the plant species of the Caryophyllaceae family that were found in the Garmian region of Iraqi Kurdistan. This resulted in the identification of ten genera and twenty-one species. The specimens were carefully managed and preserved by the herbarium of the College of Agriculture (SUFA), University of Sulaymani and the herbarium of the Kurdistan Botanical Foundation (KBFH). The identification and description method

relied on the analysis of all specimens and the verification against multiple floras, including the flora of Iraq [19], flora Iranica [20], and flora of Turkey [21]. The species' morphological traits and geographical distribution are analyzed using GIS maps. Additionally, evaluate the family based on IUCN criteria. Additionally, the identification was supported by published studies or drawings, including Robeler and Hartman [FNA], [22] and other significant scientific sources. The International Plant Names Index (IPNI) (<https://www.ipni.org/>) is followed in author

names, their abbreviations, and plant names. The Maberly Index is used to determine the taxonomy positions. as well as the webpage for Angiosperm Phylogenetics (<http://www.mobot.org/MOBOT/research/APweb>). For the majority of species, images of species groups were analyzed on JSTOR Global Plants (<https://plants.jstor.org/>) and the Virtual Herbarium (<https://herbarium.univie.ac.at/database/search.php>). The main focus of this presentation is Southwest Asia's species distribution outside of Iraqi Kurdistan. The primary characteristics that set each species apart are indicated in bold.

3 Result and discussion

This study provides information on field surveys, generic and intraspecific determination, ecological and geographical distribution, conservation condition, and new genera and species descriptions. It also illuminates key characteristics of subspecies and varieties. The results indicate that the Caryophyllaceae family is represented by ten genera and twenty-one species in the Garmian region, which are *Arenaria* (two species), *Cerastium* (one species), *Dianthus* (three species, one of them with two subspecies), *Gypsophila* (one species), *Hernaria* (one species), *Mesostemma* (one species), *Silene* (eight species), *Stellaria* (one species), *Vaccaria* (one species), and *Velezia* (one species).

Caryophyllaceae A. L. Jussieu

Kurdish name: Khezani Gulla Khaki

Annual or perennial herbs, often with inflated nodes. Simple leaves, opposite, without stipules. Inflorescence cyme. Flowers Symmetrical; sepals 5, united; free petals; stamens 5-10, single ovary, superior, placentation free central, locule 1, ovules few to many, styles 2, 3, or 5, free. Fruit capsule.

Arenaria L.

Herbs annual, perennial, frequently create caespitose. Exstipulate leaves exstipulate setaceous, linear, lanceolate or suborbicular. Inflorescence cyme, or panicle, or clusters. Flowers white, 20 – 25 mm in diameter. Sepals five, free, herbaceous, scarious or coriaceous, 1–3 veined. Petals 5, entire to retuse. Stamen 10. Style 3. Capsule opening by six teeth. Seed numerous, not arillate, reniform to subreniform, smooth, tuberculate, or papillose.

1. *Arenaria leptoclados* (Rchb.) Guss.

Herbs annual, stems up to 15 cm tall. Leaves oval to spatulate leaves; basal leaves with petioles 2-3 mm, elliptic to ovate or orbicular; stem leaves 2-5mm long. Inflorescences dichasial, cyme; bracts leafy, glandular hairy, but smaller. Flowers whiteth yellow anthers, 3-5 mm. Pedicels 2– 8 mm long; Sepals 2–3 mm long, lanceolate, glandular, margin scarious; Petal white, equal to the sepals or shorter than it, 1.4 – 2.9 mm long. Capsules are conical, equalling sepals or shorter.

Habitats: streamside, sandy and rocky soil, elevation level 230 - 1400 meter.

Blooming season: March to April.
appearance: Rare.

Distribution: Sirwan river from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2023 (1016).

Conservation issues: This species highly impacted by climate changes, habitat loss, overgrazing and degradation of the forest.

2. *Arenaria serpyllifolia* L.

Herbs annual. Stems slender, 16 cm tall, scabrid, Puberulent to glandular-pubescent, ascending to decumbent, branched. Leaves scabrid, glandular, or glabrous; basal leaves, sessile, spatulate, withering at anthesis; upper elliptic-triangular, acute-acuminate, sessile, 3–7 mm long. Inflorescence laxly dichasial with 4–24 flowers; Bracts leafy, 0.3-0.5 cm long. Flowres white; Pedicels 3 – 7 mm tall, glandular-pubescent. Sepals oval-lanceolate. acute to acuminate, 2 – 4 mm long, glandular, scabrid, 35 veined, scarious margins; Petals white, ovate, shorter than sepals. Capsule subglobose, conical, slightly shorter or longer than calyx. Seeds tuberculate, 0.4 – 0.6 mm in dia.

Habitats: Plains, rocky places, under trees, open places on mountains, at elevation 236 m.

Blooming season: May to June.

Appearance: frequent.

Distribution: Sirwan river from Garmian region, Kurdistan-Iraq.

Collections: Ahmed, Habeeb, 2023 (1014).

Conservation issues: The critical threats on this species are the expansion of Agriculture lands.

Cerastium L.

Herbs annual, or perennial. Taproots slim, perennial species, commonly rhizomatous. Stems are upright or prostrate, unbranched or branching. 8–25 cm tall, terete, pilose to pubescent, usually glandular. Leaves pubescent with a Concoction of glandular and eglandular hairs, obtuse; basal leaves oblanceolate; middle cauline leaves linear - oblong, 9–30 × 3–10 mm. Inflorescences terminal, comprising open or congested cymes, or solitary white blooms located axillary; bracts foliaceous or reduced, scarious margins, Pedicels shorter than calyx, rarely equaling; Sepals lanceolate, 7–13 mm; petals equal to or shorter than the calyx, bilobed; Styles 5. Capsule 14–23 mm long, opening by flat and narrowly triangular teeth.

3. *Cerastium dichotomum* L.

Herbs annual. Stems erect, 7–19 cm tall. Leaves ovate, or linear-oblong, 9 – 25 x 3.5 – 8 mm. Inflorescence is either loose or dense, comprising numerous flowers. Leaf-like bract. Flowers white; calyx divided, lobes ovate-oblong, 8–12 mm long; Petals white, lanceolate, 0.7–1.2 cm long; Styles 5. Capsule oblong, somewhat equal or slightly exerted from calyx, 10 – 14 mm long.

Habitat: mountainsides, ravine, rocky soil; elevation level 1500 x 1800 m.

Blooming season: April to May.

Occurrence: Occasional.

Distribution: Bamo mountain from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2023(1638).

Conservation issues: This species highly impacted by the overgrazing, habitat loss, and degradation of the ecological state of the mixed forest zone.

Dianthus L.

Herbs annual, perennial, biennial. Leaves opposite, connate perfoliate at base, linear to linear-lanceolate. Flowers are numerous, solitary, clustered, or capitate and surrounded by a bract. Flower is subtended by several pairs of imbricate epicalyx scales; Calyx teeth 5, usually triangular-lanceolate; Petals 5, long closed, limb seldom entire, usually dentate and lacinate, sometimes bearded, pink or reddish-purple, seldom white; Stamens ten. styles two. Ovary one locular. Fruit a capsule dehiscing by four teeth. Seeds doriventrally compressed, reticulate, and black.

4. *Dianthus pendulus* Boiss. & C.I.Blanche

Suffruticose perennials. Stems several, ascending or pendent (from vertical habit), 20- 35 cm, glabrous, sometimes weakly pubescent to papillose below, branched in upper part, internodes 3-7 cm. Leaves grass-like, to 60(-90)x1.5-2.0(-3.0) mm, linear, long-attenuate. green, glabrous, 3-5-veined; upper cauline leaves erecto-patent to erect; sheaths of lowest cauline leaves 3-5 x diameter of stem. Inflorescence a lax few-flowered panicle with 2-1(- 7) solitary flowers. Epicalyx scales (12-)16-30(-40), 5-10 mm, densely imbricate; outer shortly cuspidate; inner $\pm$ cuspidate weakly striate, scarious. Calyx conical (18-)24-33 mm, exceeding epicalyx scales by 12-18 mm, striate, greenish with a partly violet tinge; teeth lanceolate, 1-5 mm. Petal limb 8-10 mm, fimbriate to 1/3 - 1/2 of their length, weakly barbellate. Capsule unknown

Habitat: Vertical rocks and cliffs especially gorges; elevation 700 m.

Blooming season: June to November.

Occurrence: Occasional.

Distribution: Maidan sub-district from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2024(99).

Conservation issues: This species is significantly affected rapid loss of natural habitats and disturbance in this region.

5. *Dianthus siphonocalyx* Blakelock

Herbs perennial. Stems 48-71 cm tall. Leaves linear to linear-subulate, 2.2-6.5 cm x 0.5-1.5 mm. Flowers solitary, pedicels more than 2 cm long; epicalyx bracts 6-12, somewhat oval, sharp, with shorter linear outer edges, and borders very narrowly ciliate-membranous; calyx cylindrical, 1.2-1.6 cm x 2-3.5 mm, finely pubescent, striated; petal limb pale pink, irregularly obovate, 2-4 mm long; petal claw shortly exerted from calyx, 1.4-1.8 cm long. Capsule exceeding calyx by 1-2 mm.

Habitats: mountainsides and cliffs, eroded rocky soil; elevation 560 - 1800 m

Blooming season: April to May.

Occurrence: occasional.

Distribution: Persian frontier foothills from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2023(2094)

Conservation issues: This species is significantly affected by overgrazing especially in the areas close to the main roads.

6. *Dianthus strictus* subsp. *strictus* var. *subnervis* Banks & Soland

Herbs Perennials, with $\pm$ stout woody rootstock. Stems many, 25-96 cm tall, simple or branched, glabrous. Leaves linear-lanceolate, 15-30 x 1-2.5 mm, glabrous. Flowers solitary, sometimes also secondary flowers below with shorter pedicels or sessile; epicalyx bract 4-6; calyx cylindrical-conical (10)11-13 (-15) mm long, verruculose, wholly striate, teeth lanceolate, 3.5-5 mm long, with narrow, hyaline, ciliate margin; petals up to 25-mm long. obovate-cuneate; limb 4-7 (-11) mm long, pink to pinkish, sometimes or frequently with dark striations, yellowish on the abaxial surface, deeply dentate, barbellate. Capsule included in the calyx.

Habitats: oak forests, silty-sandy soil, and damp regions near rivers, elevation 360-870 m.

Blooming season: May to August.

Occurrence: Frequent.

Distribution: Kalar district and Persian frontier foothills from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb 2021 (81), 2022 (678), 2023 (1590), 2023 (1748).

7. *Dianthus strictus* subsp. *velutinus* (Boiss.) Greuter & Burdet

Herbs Perennials, with $\pm$ stout woody rootstock. Stems many, ca. 58 cm long, simple or branched, short-hairy; internodes 2.5-4 cm long. Leaves linear-lanceolate, 15-30 x 1-2.5 mm, margin shortly ciliate or scabrous, margin hyaline at the base. Flowers solitary, sometimes also secondary flowers below with shorter pedicels or sessile; epicalyx scales 4-6; calyx cylindrical-conical (10) 11-13 (-15) mm long; petals up to 25 mm long, obovate-cuneate; limb 4-7 (-10) mm, pink to pinkish, sometimes or frequently with dark

striations, yellowish on the abaxial surface, deeply dentate, barbellate. Capsule included in the calyx.

Habitats: stony slopes in Quercus forests, silty-sandy soil, and damp regions near rivers, mountainsides, elevation 1760 m.

Blooming season: May to August.

Occurrence: Occasional.

Distribution: Bamo mountain from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, Saman A. Ahmad, 23(2134).

Conservation issues: This species highly affects by habitat loss and degradation of the woodlands.

8. *Dianthus zonatus* var. *hypochlorus* (Boss. & Helder) Reeve

Herbs Perennial. Stems erect, up to 50 cm tall, branched, glabrous, sometimes shortly hairy. Leaves linear, up to 38 mm long, with short hairs on the margin. Flowers on a freely branched inflorescence, pedicels 3-30 mm long; epicalyx scale 4-10; Calyx pale green with a purple tinge on the upper parts, subcylindrical, 12-18 mm long, and glabrous; petals 18-25 mm long, limb pink. Capsules Capsules ovoid to oblong.

Habitats: mountainside, plain area, elevation 500 - 1765 m.

Blooming season: July to August.

Occurrence: frequent

Distribution: Bamo mountain from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, Saman A. Ahmad, 23(2135).

Gypsophila L.

Herbs can be classified as annual, biennial, or perennial, rarely subshrubs, glaucous, glabrous, glandular, or often glandular-hairy. Leaves are typically linear to lanceolate, ovate or elliptic in shape. Flowers are tiny, arranged in dichasial cymes, panicles, or heads; bracts are green or scarious, and bracteoles are absent. calyx campanulate, turbinate, seldom tubular, 5-toothed; petals 5, linear to cuneate, without coronal appendages, inserted on a cup-shaped disc; Stamens 10; androphore very short; styles 2. Capsule unilocular, globular or oblong. 4-valved. Seeds auriculate, compressed on both sides. Usually tuberculate.

9. *Gypsophila pilosa* Hudson

Herbs annual. Stems up to 70 cm tall, branching divaricately with the ultimate. Leaves 10-70 x 2-17 mm, lanceolate, smaller above, sessile, apex acute, 3-5-veined, pilose, especially on the veins and margins. Inflorescence is a lax panicle, bracts much shorter than pedicels. Pedicel 25-30 mm long, slender, glabrous; calyx 6-7 mm long, campanulate, pilose, glandular; teeth triangular, acute, ciliate; petals white to pale pink, 3-12 mm, linear-oblong,

emarginate at the apex. Capsule broadly ovoid, long as long or slightly exserted from than calyx; seeds c. 1.5 mm, tuberculate.

Habitats: mountain ruins, sandy clay soils, fields at elevation 192-569 m.

Blooming season: April to June.

Occurrence: Common.

Distribution: Kalar – Darbandikhan road, Kifri district and Kalar district from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, Saman A. Ahmad, Swara H. and Paiman Hama, 21(267), 22(239), 22(324), 22(432), 23(163), 23(240), 23(328), 23(399), 23(435), 23(521), 23(554), 23(600), 23(673), 23(749), 23(916), 23(1317), 23(1378), 23(1410), 23(1468), 23(1517).

Hernaria L.

Herbs annuals, perennials. Stems are prostrate or procumbent, branching from the base. Leaves opposite or alternate on flowering branches, sessile or subsessile, entire, primarily obovate or broadly oblanceolate to spatulate to nearly elliptic; stipules minute, scarious. Flowers 4- or 5-merous, very small. in leaf-opposed or apparently axillaries; bracts inconspicuous; sepals free, equal or unequal; petal inconspicuous, subulate, filiform; stamens 2-5; staminode 4 or 5. Filiform, occasionally absent. Stigmas 2, sessile or on a short style. Fruit 1-seeded, indehiscent.

10. *Herniaria hemistemon* J. Gay

Herbs perennial. Stems 4-14 cm tall, prostrate, shortly retrorsely pubescent to puberulous. Leaves mostly opposite, oblong-elliptic, 2.5-5 mm long, subsessile, obtuse, pubescent; stipules ovate-triangular with ciliate to fimbriate margins; upper ones purple or white. Flowers sessile, axillary clusters with long hooked hairs on the perigynous region; bracts are similar to upper stipules; sepals 4, papillose or hirtellous on the back, unequal; outer pair deltoid-spatulate, ±1.5 mm long, thickened; petals absent. Stamens 2, staminodes absent; stigmas 2, filiform, pale brown. Fruit ovoid-ellipsoid.

Habitats: stony hillsides, riverside, sandy soil, elevation 236-396 m.

Blooming season: February to April.

Occurrence: Occasional.

Distribution: Distribution: Sirwan river and Bawanur sub-district from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, Bakhtiar Ali and Dilan Jumaa, 21(48), 23(1014), 23(1248), 23(1346), 23(1573).

Mesostemma Vved.

Herbs perennial. Leaves are linear and predominantly deciduous. Lax dichasial inflorescence. Flowers white. Calyx tubular, five-

ribbed with translucent interstices. Petals 5, with linear claw and deeply (3-)5-lobed limb. Stamens 10. exserted. Ovary ovoid, sessile with two long styles. Capsule oval to oblong, dehiscing from the base via longitudinal slits, containing 1-3 seeds: seeds reniform, globose, enveloped in granular coats. 11. *Mesostemma gypsophiloides* (Fenzl) M.T.Sharples & E.A.Tripp.

Herbs perennial with a thick, woody caudex. Stem up to 60 cm tall, glabrous to glandular-hairy below glandular-hairy above, sometimes viscous with sessile glands. Leaves linear, 18-10 x 1-2 mm, caducous. Bracts triangular, minute. Pedicels capillary, to 20 mm. glabrous to glandular-hairy; calyx tubiform. 1-5 mm long, teeth ovate, obtuse, much shorter than the tube; petal limb (3-)5-lobed, central lobe entire, deltoid. Capsule elliptic with two seeds, shorter than the persistent calyx. Seeds are 1.2 mm, tuberculate.

Habitats: Dry hills, stony limestone soils, at elevation 895 m.

Blooming season: June.

Occurrence: Occasional

Distribution: Barwen village near Bamo district from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2023 (2013).

Silene L.

Etymology: Derived from the Greek term for silences, likely originating from Silenus, the inebriated guardian of the Greek deity Bacchus, who was depicted as enshrouded in froth, possibly referencing the viscous fluid found in numerous species.

Annual, biennial, and perennial herbs. Stems erect to ascending to decumbent, usually with woody rootstock in perennials. Cauline leaves are radical, opposite, lamina various, typically entire, sessile to cuneate at base, exstipulate. Flowers solitary, dichasial or in panicle.

cymes or in racemes; pedicellate. Bracts and bracteoles as leaves. Sepals 5, united to form a cylindrical to conical calyx, sometimes inflated, 5-1 toothed above, 5-(10-30)-nerved. glabrous, glandular to pubescent. Petals white to variously pink, 5, free, each with a claw and limb; claw sometimes expanded apically to form auricles (Section Auriculatae); limb bilobed to almost entire or sometimes fimbriate. Stamens 10, in two whorls. Styles 3-5. Ovary, stamens, and petals are borne on an anthophore. Fruit capsular, dehiscing by twice the number of styles. Seeds are usually reniform or globose, smooth or variously sculptured, back often with a groove, sometimes winged or papillose.

12. *Silene ampullata* Boiss.

Perennial, 57-80 cm, thick. Stems many, upright to ascending, shortly pubescent. Sterile shoots ± glandular, leafy. Leaves 15-30 x 0.5-1 mm, linear, base sessile, apex acute, glandular-pubescent. Flowering shoots with a few distantly placed leaves. Inflorescence is a congested raceme with three to five flowered cymules. Calyx 8-18 mm, cylindrical, barely inflated, in fruit

membranous and inflated. greenish yellow. contracted at the apex. glandular-pubescent: teeth triangular. Petals yellowish green; limb 7 mm. Capsule 5-6 mm, subglobose, included in the calyx, 1(-2) seed

Habitats: commonly found on limestone on mountainsides, frequently in oak forests, elevation 1300 x m.

Blooming season: April to May.

Occurrence: Frequent.

Distribution: Bamo mountain from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 23(2162).

13. *Silene apetala* Wild.

Annual herbs. Stems reach heights of up to 50 cm, are erect, either simple or branching, and exhibit pubescence. Leaves measuring 10-30 x 1-2 mm, linear-lanceolate; pubescent, with a clasping base at the node. Bracts like leaves, however smaller and pubescent. Flowers 1-3, arranged in axillary clusters; pedicels measuring 4-20 mm in length, pubescent, typically exceeding the length of the calyx; calyx 8-9 mm long, campanulate, broader and pubescent, particularly along the nerves, with lanceolate, ciliate teeth and greenish nerves; petals white or pinkish, either short or occasionally exceeding the calyx, with petals sometimes absent. Capsule about 4-7 mm in length, globular in shape, and encased within the calyx. Seeds measuring 1-2 mm in length, featuring a grooved posterior and two undulating wings laterally.

Habitats: Cultivated fields, alluvium hummocks, depressions under the shade of underchanging rocks, riverbanks, and waste places in gravelly and sandy soils, elevation 169-351 m.

Blooming season: February to April.

Occurrence: Frequent.

Distribution: Kalar, Kifri, Sarqalla sub-district and roads of Parviz Khan border terminal from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, Hawsar Kaka, Swara Habeeb, 2021(11), 2021(252), 2021(304), 2022(48), 2022(84), 2022(205), 2022(326), 2022(455), 2023(66), 2023(131), 2023(239), 2023(325), 2023(354), 2023(397), 2023(473), 2023(518), 2023(598), 2023(747), 2023(918), 2023(1375), 2023(1428), 2023(1852), 2023(1908).

14. *Silene colorata* subsp. *Oliveriana* (Oth) Rohrb.

Herbs annual. Stems ascending to decumbent, branched or unbranched, 10-31 cm tall, whitish, pubescent to pilose, glandular. Leaves measure 18-50 x 3-1.1 mm, with an obovate-spathulate or oblong-lanceolate to oblong-linear shape, with the upper leaves frequently being linear-lanceolate. Inflorescence raceme-like monochasium. Bracts are narrow, lanceolate or linear, and foliaceous. Calyx 11-16 mm long, papery, cylindrical,

clavate in fruit, pubescent, teeth ovate, ciliate, only its nerves and teeth green. Petals are pinkish-purple to white, with a bilobed limb consisting of linear lobes of 6-10 mm in length. Capsule broadly ovoid, Seeds around 1 mm wide, reniform with a winged or extensively grooved posterior surface, or minutely tuberculate.

Habitats: oak forest, sandy soil, elevation 169-1260 m.

Blooming season: February to April.

Occurrence: Occasional.

Distribution: Bamo mountain, Khan Rostam Agha, Rizgari sub-district, Sirwan river and Tuni Baba valley from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2021 (37), 2022 (284), 2023 (165), 2023 (355), 2023 (689), 2023 (867), 2023 (919), 2023 (1151).

15. *Silene coniflora* Nees & Otth.

Herbs annual. Stem simple or branched, 10-40 cm tall, erect, glandular-pubescent, viscid. Basal leaves linear to lanceolate 12-30 x 25-6 mm, acuminate; cauline leaves lanceolate, rarely linear, 15-15 (-60) x 1-8 mm. Calyx measuring 8-12 mm, conical in shape, and glandular-pubescent, particularly along the nerves; teeth are lanceolate and possess 15-20 nerves. Petals white-pink, obovate-cuneate, with a smooth margin. Coronal scales are elongated. Carpophore around 1 mm in length. Capsule around 10 mm in length, oblong-conical, situated within the calyx.

Habitats: Fields, roadside, mountainside among oak forest, elevation 169-350 m.

Blooming season: June to July.

Occurrence: Frequent.

Distribution: Bamo mountain, Kalar and Kifri from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2022 (75), 2022 (488), 2023 (132), 2023 (398), 2023 (520), 2023 (551), 2023 (597), 2023 (746).

16. *Silene conoedia* L.

Herbs annual. Stem 8-46 cm tall, branched at the apex or at the base, including a short, dense retrorse indumentum underneath and a highly glandular surface above. Leaves 15-80 x 3-12 mm, linear-lanceolate or oblong. Bracts long attenuate from ovate base 8-16 mm, 3-5-nerved, with glandular and glandular hairs. Inflorescence dichasium, 1-24-flowered. Pedicels 6-30 mm long. Fruiting calyx enormously inflated; calyx tubular conical, 16-35 mm long, constricted at apex with 30 nerves, nerves green with short glandular hairs. Capsule 11-18 mm long, conical, with a slender neck, encompassed by the calyx. Petals pink, reddish, or lilac; limb 11-15 mm. Seeds reniform, brown.

Habitats: agriculture land, oak forest, mountainside, sandy and loamy soil, gravel, elevation 203-1564 m.

Blooming season: March to August.

Occurrence: Common.

Distribution: Bamo mountain and Kalar- Darbandikhan from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2022 (206), 2023 (324), 2023 (672), 2023 (1110), 2023 (1289), 2023 (1574), 2023 (1779).

17. *Silene longipetala* Vent.

Herbs perennial. Stem erect, up to 70 cm tall, slight woody stock, glabrous, frequently viscid above, with short retrorse hairs. Basal leaves rosulate, 30-55 x 11-15 mm, lanceolate to ovate-lanceolate, puberulent; cauline leaves sessile. Bracts and bracteoles are similar to cauline leaves but reduced in size upwards. Inflorescence is a lax panicle, the lateral branches usually ending in 7-flowered dichasia. Calyx 10-12 mm long, cylindric and tapering below, clavate and slightly constricted below the capsule in fruit; teeth triangular, with a ciliate margin. Petals white, pinkish, or lurid; limb 13-14 mm long, deeply bilobed. Filaments hairy; anthophore 2-4 mm long, pubescent. Capsule 6-9 mm long, conical. Seeds $\pm$ reniform, 1 – 1.5 mm long.

Habitats: mountainside, open oak forest, rocky soil, 500 - 1450 m.

Blooming season: March to June.

Occurrence: Occasional.

Distribution: Bamo mountain from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2023 (1712).

18. *Silene microsperma* Fenzl.

Herbs annual. The stem is 50-70 cm in height, is erect and spreading, pubescent in the lower section, scabrous, and glabrous with sessile glands in the upper part. Basal leaves are linear or oblanceolate, measuring 1.0-4.0 x 1.0-4.0 mm, and are pubescent; cauline leaves are linear, measuring 10–25 x 1–2 mm, and are also pubescent. Calyx 9-14 mm in length, campanulate at anthesis and clavate in fruit, pubescent; teeth uneven. Inflorescence non-divaricate. Petal claws 4-7.5 mm long, ciliate; limbs 5-7 mm long, bifid; styles exerted. The first pedicel is 12-30 mm long in flower, 10-40 mm long in fruit. Capsule 6-7 mm long, oblong, fragile. Seeds 0.6-1 mm wide, 0.4-0.8 mm high, testa smooth or papillate.

Habitats: shadow, wet places, roadside, and streamside, elevation 260-400 m.

Blooming season: March to June.

Occurrence: Rare.

Distribution: Bamo mountain and Sirwan river from Garmian region, Kurdistan-Iraq.

Conservation issues: This species significantly impact by ecological condition specially the level

of river and stream.

Collections: Ahmed Habeeb, 2023(1512), 2023(1575), 2023(1969).

Conservation issues: This species highly impacted by the habitat loss, and degradation of the ecological state of the woodland.

***Stellaria* L.**

Herbs annual or perennial. Stems up to 40 cm tall, weak and slender. Inflorescence of dichasial cymes. Flowers white; sepals 5; petals absent or 4-5, usually deeply bifid, white; stamens (2-7-10); styles 2-3. Capsule ovoid; teeth twice as many as styles. Seeds numerous, reniform or suborbicular. Usually tuberculate.

19. *Stellaria media* (L.) Vill.

Herbs Annual. Stem up to 40 cm tall, prostrate to ascending. Leaves 3-11 x 3-7 mm, elliptic to ovate-elliptic or cordate, sessile or petiolate (the lower leaves usually with a short or long petiole), acute to subacute, glabrous with the margin hairy or hairy on the nerves or sparsely hairy. Flowers in lax panicles; pedicels are filiform, up to 2 cm long; sepals 3-7 mm long, lanceolate, hairy or glabrous; petals bluish and deeply bilobed. Capsule exceeding the calyx, splitting by valves nearly to the base. Seeds dark brown, tuberculate.

Habitats: Cultivated lands, streamside, shadow places, oak woodlands, clay or loam soils, elevation 300 – 2700 m.

Blooming season: March to May.

Occurrence: common.

Distribution: Sarqalla sub- district from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2021 (249).

***Vaccaria* Wolf.**

Herbs annual, glabrous. Leaves sessile. Flowers in expansive dichasial panicles. Calyx devoid of commissural veins, featuring five green wings. Petals devoid of coronal scales. Stamen 10. Styles two. Capsule papery, dehiscent by four teeth.

20. *Vaccaria hispanica* (Miller) Rauschert

Herbs annual. Stems 24-60 cm tall, erect, branched at apex. Leaves 23-85 x 5-19 mm, lanceolate to ovate-lanceolate, apex acute, base sessile, clasping the stem above. Pedicels 10-40 mm long. Flowers pink, white; calyx 10-14 mm long, with five conspicuous wings, obclavate at first, pyramidal in fruit, teeth broadly triangular or triangular-acuminate; Petals pink or white in a few samples, 14-20 mm long, limb create-cordate; coronal scales absent stamen 10; styles 2. Capsule ovoid, many-sided. Seed 2 mm in diam., subglobose, black.

Habitats: Hillsides, mountain slopes, cultivated lands, sandy, gravelly soils, shady places lower open oak forest, roadsides, and plain agriculture lands, elevation 169-1255 m.

Blooming season: April to June.

Occurrence: Common.

Distribution: All areas of Garmian region, Kurdistan-Iraq. Collections: Ahmed Habeeb, Swara H., Saman A. Ahmad, and others, 2021(82), 2021(234), 2023(276), 2023(345), 2022(207), 2022(258), 2023(325), 2022(431), 2022(487), 2022(504), 2022(616), 2022(782), 2022(871), 2023(164), 2023(400) 2023(472), 2023(484), 2023(519), 2023(550), 2023(599), 2023(688), 2023(748), 2023(868), 2023(917), 2023(952), 2023(1015), 2023(1247), 2023(1297), 2023(1316), 2023(1348), 2023(1423), 2023(1467), 2023(1513), 2023(1571), 2023(1671), 2023(2266).

***Velezia* L.**

Herbs annual. Stems up to 40 cm tall, erect to ascending, divaricately branched, glandular-pubescent, sometimes glabrous. Leaves 6-12 x 0.75-1 mm, linear, sessile, more or less expanded at the base with a hyaline ciliate margin, acute at the apex. Flowers solitary in the axils of leaves or up to 4 in axillary fascicles; pedicels up to 3 mm long, thick, glabrous to glandular pubescent; calyx 12-15 mm long, glabrous to glandular pubescent, 10 - 15 nerved; teeth 1 mm long; petals pink, bifid, exceeding calyx; claw as long as the calyx tube. Capsule cylindrical, shorter than calyx.

21. *Velezia rigida* L.

Herbs annual. Stems up to 34 cm tall, erect or ascending, divaricately branched, rigid, glabrous at the internodes, glandular-pubescent near the nodes, or glabrous throughout. Leaves 7-12 x 0.75-1 mm, linear, sessile, apex acute, expanded at base with hyaline ciliate margin. Flowers solitary in leaf axils or up to six in axillary fascicles; pedicels 2-3 mm thick, glandular-pubescent. Calyx 12-15 mm in length, narrowly cylindrical, glandular-pubescent, 15-nerved, teeth 1 mm long. Petals pink, claw as long as the calyx tube, limb bifid. Capsule cylindrical, shorter than calyx.

Habitats: rocky mountainside, sandbanks near river, open fields, elevation 265-1404 m.

Blooming season: May to June.

Occurrence: Occasional.

Distribution: Bamo mountain and Sirwan river from Garmian region, Kurdistan-Iraq.

Collections: Ahmed Habeeb, 2022(633), 2022(657), 2023(1319), 2023(1670).



Figure 2: a. *Silene colorata* subsp. *Oliveriana* (Otth) Rohrb a1. flower of *Silene colorata*, b. *Silene conoidea* L., c. *Silene coniflora* Nees. & Otth., d. *Vaccaria hispanica* (Miller) Rauschert

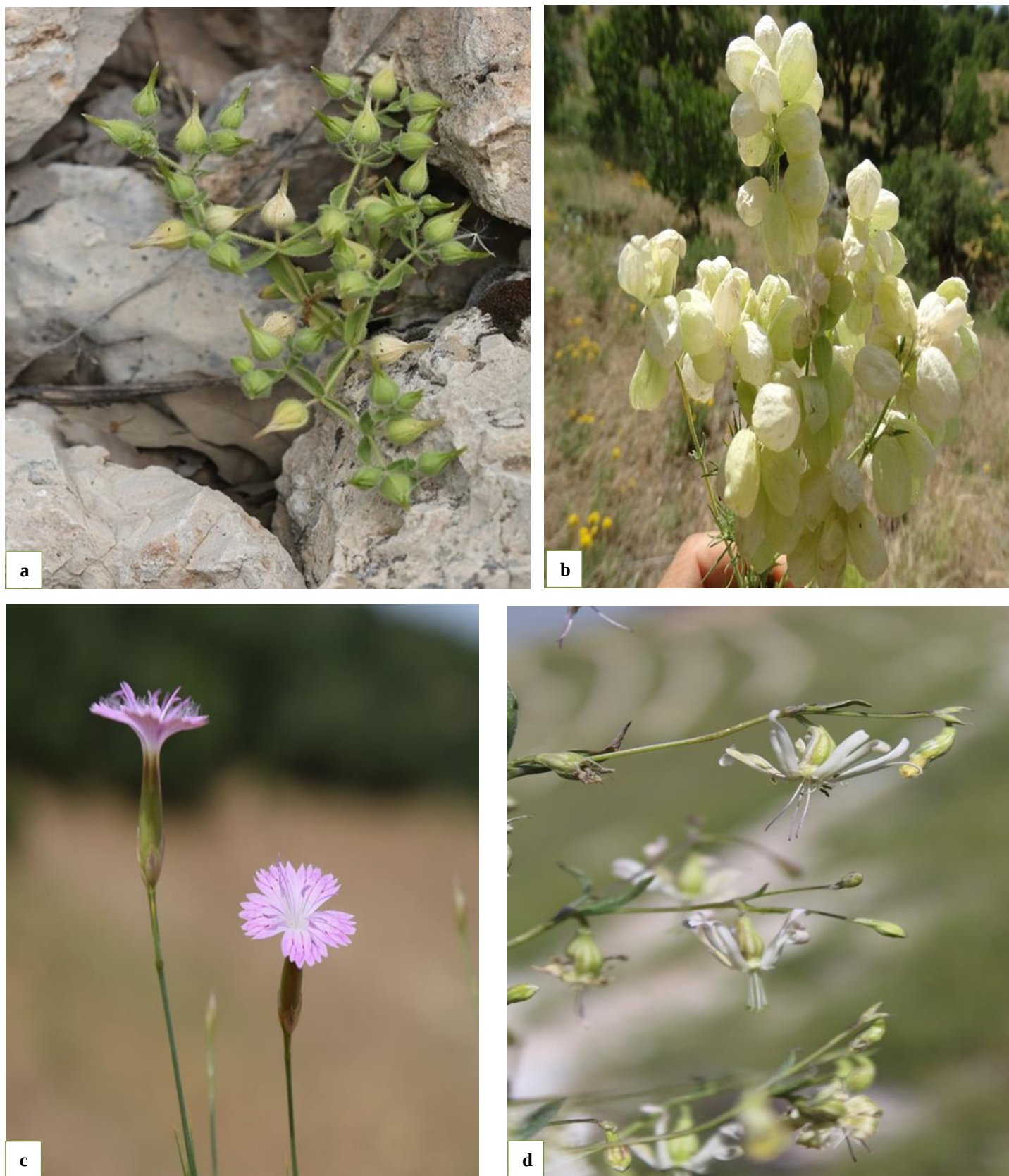


Figure 3: a. *Cerastium dichotomum* L. b. *Silene ampullata* Boiss c. *Dianthus strictus* Banks & sol. d. *Silene longipetala* Vent.

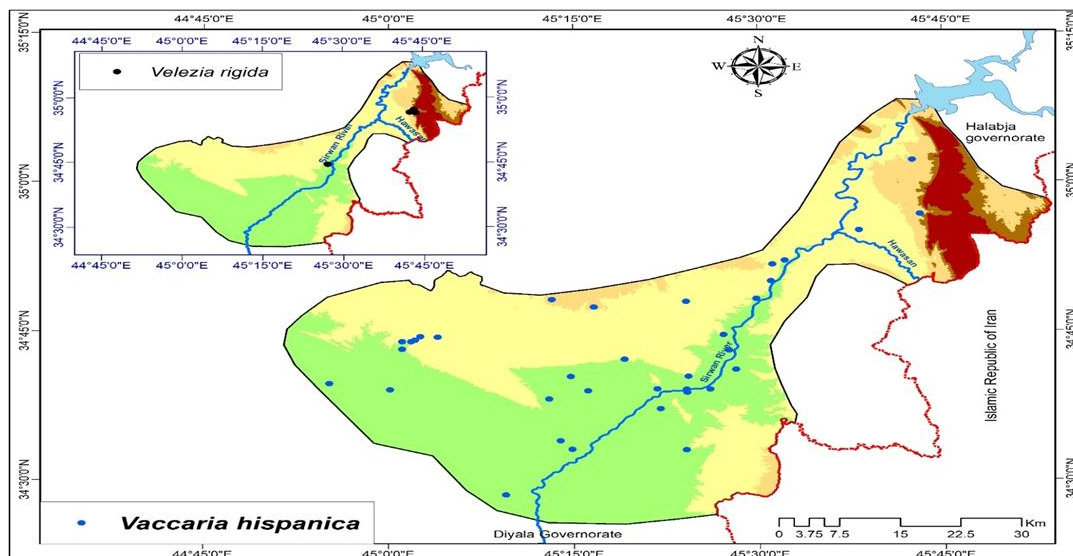


Figure 4: Geographical distribution of *Velezia rigida* L. and *Vaccaria hispanica* (Miller) Rauschert.

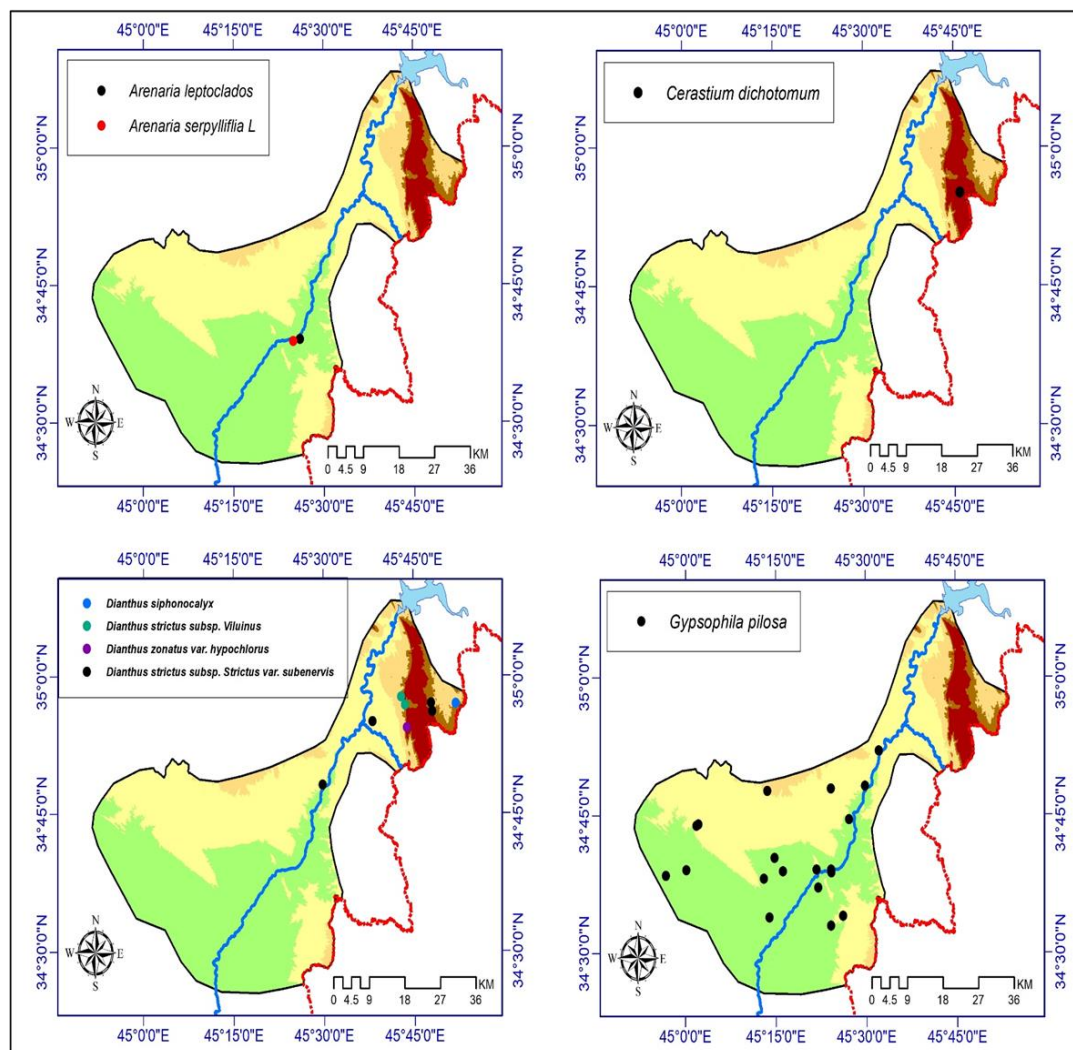


Figure 5: Geographical distributions of *Arenaria* spp., *Cerastium* sp, *Dianthus* spp. and *Gypsophila* sp.

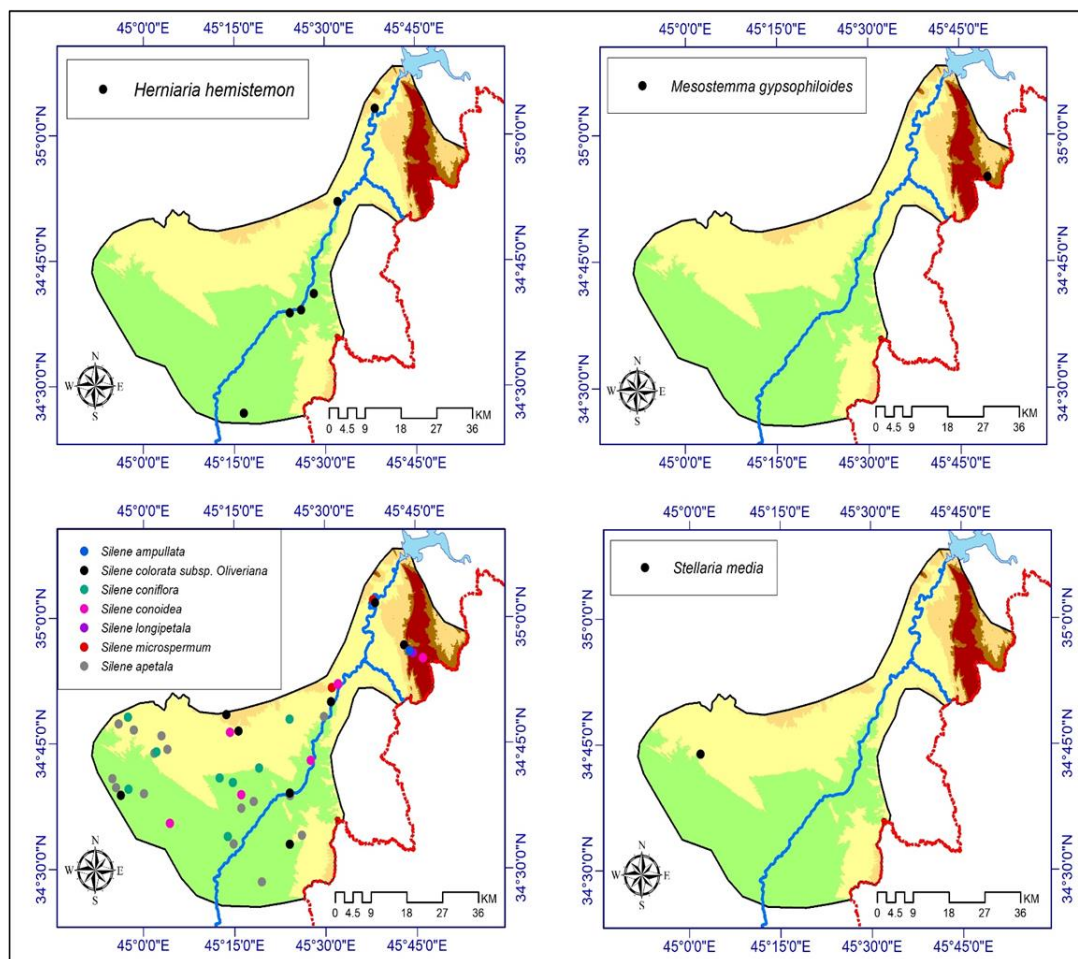


Figure 6: Geographical distributions of *Herniaria* sp., *Mesostemma* sp., *Silene* spp. and *Stellaria* sp.

References

- [1] Guest, E. and Al-Rawi, A. Introduction to the flora. **1**, Ministry of Agriculture, Republic of Iraq, (1966).
- [2] Rahimi, I., Duarte, L., & Teodoro, A. C. Zagros Grass Index—A New Vegetation Index to Enhance Fire Fuel Mapping: A Case Study in the Zagros Mountains. *Sustainability*, **16**(10), doi: 10.3390/su16103900 (2024).
- [3] Chigani, H. K. The floristic composition, biological spectrum, and chorotypes of vegetation in the watershed of the Kordan region, west Alborz province, Iran. *Journal of Plant Ecosystem Conservation*, **12**, (2024).
- [4] Walter D R and Keil D J Vascular plant taxonomy. *California. Polytechnic State University*, (1988).
- [5] Bittrich V Caryophyllaceae. In: Kubitzki K, Rohwer J G, and Bittrich V (eds). The families and genera of vascular plants, flowering plants, dicotyledons, Magnoliid, Hamamelid, and Caryophyllid families, Berlin, Germany: *Springer-Verlag* **2**, 206-236, (1993).
- [6] Karim, F.M. and Fawzi, N.M. Flora of the United Arab Emirates. **1**, *United Arab Emirates University, Al Ain, UAE*, (2007)
- [7] Hernández-Ledesma P., Berendsohn W. G., Borsch T., von Mering S., Akhiani H., Arias S., Castañeda-Noa I., Eggli U., Eriksson R., Flores-Olvera H., FuentesBazán S., Kadereit G., Klak C., Korotkova N., Nyffeler R., Ocampo G., Ochoterena H., Oxelman B., Rabeler R. K., Sanchez A., Schlumpberger B. O. & Uotila P. A taxonomic backbone for the global synthesis of species diversity in the angiosperm order Caryophyllales. – *Willdenowia* **45**, 281–383, (2015).
- [8] Tutin, T.G.; Heywood, V.H.; Burges, N.A.; Valentine, D.H.; Walters, S.M.; and Webb, D.A. *Flora Europaea. Cambridge: At the University Press.* **1**, 115-132, (1964).
- [9] Davis, P.H. and Cullen, J. The Identification of flowering plant families. *Cambridge University Press*, (1965).
- [10] Zohary, M. Flora of Palestina. Equistaceae to Moringaceae. *The Israel Academy of Sciences and Humanities*, **1**(1), 80-117, (1966).
- [11] Gorhkova, S.G.; Knorring, O.E.; Kuzeneva, O.I.; Muraveva, O.A.; Tolmachev, A.I.; Schishkin, B.K.; Shteinberg, E.I.; and Vasilchenko, I.T. Flora of the U.S.S.R. **VI Centrospermae**, 370-379, (1970).
- [12] Rendle, A.B. The Classification of Flowering Plants II: Dicotyledons. London: *Syndics of the Cambridge University Press*, (1975).
- [13] Mabberley, D.J. *Mabberley's Plant-Book: A Portable Dictionary of Plants, Their Classifications, and Uses. Cambridge University Press, Cambridge*, (2008).
- [14] Ahmad A. S. Vascular plants of Hawraman region in Kurdistan Iraq. *University of Sulaimani, Kurdistan Iraq*, (2013).

- [15] Ahmad S. and Salih S. Qaradagh mountain plant field guides. American university of Iraq, *Iraq (AUIS) press* (unpublished), (2019).
- [16] Hama, S.Y., Vascular plants of Gmo Mountain., *University of Sulaimani*, (2020).
- [17] Sdiq W. Mradl, Jawhar F. Saeed, Vascular Plants of Makok Mountain in (Mountain Region-Rowanduz District) Kurdistan Region/Iraq. *ZANCO Journal of Pure and Applied Sciences*, **35**(3), 221-235, (2023).
- [18] Karim, M. M. A geographical analysis of population and human development in the Garmianministration. *University of Slemani*, (2023).
- [19] Ghazanfar, S. A. and Edmonson, J. R. (eds.) Flora of Iraq. **5**(1), Elatinaceae to Sphenocleaceae. Ministry of Agriculture, Iraq, and Royal Botanic Gardens, Kew, (2016).
- [20] Rechinger, K. H. (Ed.). Flora Iranica, Volume **153**, Caryophyllaceae. Akademische Druck- und Verlagsanstalt, (1974).
- [21] Davis, P. H. (Ed.). Flora of Turkey and the East Aegean Islands, Vol. II. *Edinburgh University Press*, (1982).
- [22] Richard K. Rabeler, Ronald L. Hartman. Flora of North America, Volume 5, Caryophyllaceae. *Oxford University Press*, (2005).