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Contributions to the Flora Palaestina Region, part 2

Abstract

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The Flora Palaestina is considered to be a well-studied flora in the Middle East and worldwide. Nevertheless, surveys conducted in recent years have revealed many new findings. This is our second paper to assemble and discuss some of these important findings, reporting 23 new floristic records for the region.

Key words: Floristics, endangered species, Israel, Mediterranean area.

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Introduction

The Flora Palaestina region (Israel, the Palestinian Territories, western Jordan and the Golan Heights) has been studied thoroughly since the late 19th century and until the early 21st century (Boissier 1872; Post 1896; Aaronson 1931, 1941; Dinsmore Eig & al., 1954; Zohary 1966, 1972; Feinbrun-Dothan 1978, 1986; Zohary & al. 1980–84; Danin 2000, 2004). About 2,400 species were recorded within the borders of the state of Israel and the Palestinian territories, and about 2,700 when including western Jordan (Fragman & al. 1999). The last comprehensive work summarizing the known data on the entire local flora was published in 1991 in the Analytical flora (Feinbrun-Dothan & Danin & al. 1991). The last published checklist (Fragman & al. 1999) includes comprehensive data on all species, new findings and tagging for doubtful species. Since 2000 only sporadic updates were published: additional updates to the flora were published by Gretuter and Raus (Euro+Med Checklist Notulae) mostly by Danin (e.g. Danin 2009; Danin & al. 2011), and some in other papers and books – by local and non-local botanists (e.g. Domina & Raimondo 2009; Fragman-Sapir & Fritsch 2011; Peri 2015). Other findings were not published at all. Our previous paper (Ben-Natan & al. 2024) included 28 species newly documented in the region which were discovered or identified in the past ± 20 years. In the past five years, new findings were made each year during field surveys and botanical expeditions. Some

of these findings were reported by surveyors and field botanists or by amateurs, some are based on new identifications of known plants or new treatments of previously documented species. None of these new floristic records were formally published in peer-reviewed literature. Some were published in Hebrew with partial data, without specimens being collected or vouchers being deposited in any herbaria, and some were reported only in forums and social media.

In this paper we treat further 23 species newly documented in the region from the last ± 20 years. The purpose of the previous paper, this paper and the future ones, is to eventually cover all of the previously undocumented findings for the region. We have collected and assembled data on all these, along with extensive collections of plant materials which were dried, deposited in the HUJ and the TELA herbaria, and are included here as vouchers for each newly reported species. In addition, some of them were grown in the Jerusalem Botanical Gardens in order to examine their morphology in further detail, and verify their identity.

The new findings are listed here in alphabetical order of taxonomic families, and in alphabetical order within each family. For every species we bring the relevant taxonomic and discovery histories, as well as habitat information, additional remarks, and a list of vouchers deposited and examined in the local herbaria.

The new floristic records

Alismataceae Vent.

Alisma gramineum Lej.

Alisma gramineum Is first mentioned from the Flora Palaestina region in Zohary (1989), where it's recorded from Sinai and the Golan Heights. The basis for the latter claim is unclear, but it has been speculated that like some other records from the area mentioned in Zohary (1989) and later sources (such as Danin and Feinbrun-Dothan 1991), it's based on records from S Syria. Later, the species has been recorded by Prasse in Ein Yered in the Shfela in 1994 (Fragman-Sapir 1999). This and later records from the Upper Galilee (Ein Roim) have been examined and reidentified by Ben-Natan, Fragman and Shemesh (2024) as *Sagittaria subulata* (L.) Buchenau., and thus it was concluded that *Alisma gramineum* is not present in Israel.

In summer 2024, some populations of *Alisma* sp. from the NE Golan Heights were examined during the rare plant survey executed by Deshe OLI for the INPA, and identified as *Alisma gramineum* – the first verified record of this species from Israel. As this species is already known from S Syria, its presence in the Golan Heights is not surprising – although it is extremely rare there, in contrast to the more locally common and similar *A. lanceolatum* With. As of now, *A. gramineum* is known from only two localities in the Golan Heights, at the NE border of the region. The plants grow there in vernal ponds on basaltic soil, in herbaceous plant association within a wet habitat. At least one of the localities concludes a large population with a few hundreds of mature individuals.

Reference material: ISRAEL, Golan Heights, in water and on the drying mud on the shores of a trench N of Qunetra Reservoir, coor: 33°07'59.6"N 35°48'56.6"E. 25.Jul.2024, Dar Ben-Natan, Dvora Lev-Ramati & Noam Segev (HUJ1005804!, HUJ1005805!, HUJ1005806!, TELA4907!).

Apiaceae Lindl.***Daucus involucratus* Sm. (Fig. 1a)**

This delicate annual is known currently in the region only from a single location in the Judean Mts, west of Jerusalem, where it grows in a planted *Pinus brutia* Ten. forest. This species has been known for a hundred years from this site, and was misidentified up until now as *Daucus guttatus* Sm., which differs from *D. involucratus* Sm. in its bract and fruit-spines characteristics. It was reidentified by Bar Shemesh in 2024. Currently, there is no evidence of the latter occurring in the region, and all other sheets identified as *D. guttatus* in the HUJ herbarium belong to *D. broteri* Ten.

Reference material: ISRAEL, Judean Mts, kiriyat Anavim, 16.May.1925, *Noah Naftolsky* (HUJ31712!); ISRAEL, Judean Mts, kiriyat Anavim, 23.Apr.1990, *Ori Fragman-Sapir and Noam Bar-Shai* (HUJ126205!); ISRAEL, Judean Mts, near kiriyat Anavim, 5.May.2020, *Ori Fragman-Sapir* (HUJ133393!).

***Ferula coskunii* H.Duman & Sagiroglu**

Herbaceous perennial, found several times in the Upper Galilee in Mt Meron, Mt Shazor and Manara as well as in Mt Hermon. The plant was collected to the HUJ herbarium first by Clara Heyn in 1972. It has gone unidentified for decades and was treated as *Ferula meronensis* (nom. nudum.) in the Red Data Book of Israel plants. Vol 1 (Cohen & Shmida 1992). Recently, the local populations of this species were identified by Shmuel Mazar as *F. coskunii* (Mazar & Leshner 2016), a recently described species known up until now as endemic to the Amanos Mts in southern Turkey, and known from only two locations there (Duman & Sagiroglu 2005). The species occurs in the northern margins of the region, and was collected to the HUJ herbarium from Lebanon and Jordan as well (Mazar & Leshner 2016). It might be present in Syria as well.

Reference material: ISRAEL, Upper Galilee, Mt Meron, 3.5.1972, *Clara Heyn* (HUJ135068!), ISRAEL, Mt Hermon, Wadi Asal, 1000m., 10.5.1981, *G. Ne'eman* (HUJ135073!), ISRAEL, Upper Galilee, Mt Shazor, *Quercus coccifera-Pistacia terebinthus* maquis on Terra rosa soil on hard limestone, 26.4.1982, *R. Berliner* (HUJ135072!), ISRAEL, Upper Galilee, Mt Shazor, 21.6.1989, *D. Kaplan & M. Asaf* (HUJ135071!), ISRAEL, Upper Galilee, top of Mt Meron, alt: 1150m, 18.8.1989, *A. Aharoni & A. Lev* (HUJ135069!), ISRAEL, Upper Galilee, near Manara, 31.7.2016, *Shmuel Mazar* (HUJ135070),

***Torilis leptocarpa* (Hochst.) C.C.Towns.**

This species was first recorded in the Golan Heights by Zohary in 1968, and was later collected from several location in the Golan Heights by several botanists and surveyors up to the 1990's, but for some reason its occurrence in the region was never officially published in literature. In 2018, plants collected by Shmuel Mazar were identified once again as *Torilis leptocarpa* by Shimon Cohen-Sivan, and brought to the attention of the local botanist community.

Reference material: ISRAEL, Golan Heights, Mazraát El Nab (Nov Meadow), damp fields, 30.4.1968, *M. Zohary* (HUJ370750!, HUJ370751!, HUJ370752!), ISRAEL, Golan Heights, Mazraát Nab (Nov Meadow), fallow field, basalt soil, 27.5.1969, *N. Zeligman*

(HUJ370746!), ISRAEL, Golan Heights, Nov Meadow, 1.5 km SW of Ramat Magshimim, coor: 2247/2489, alt: 410 m, herbaceous flat area, heavy basalt soil, flooded seasonally in winter and extremely dry in summer, dominance of *Hordeum bubosum* L. and *Hordeum spontaneum* C. Koch, 5.5.1991, *O. Cohen* (HUJ370743!), ISRAEL, Golan Heights, Nnear Nahal El-Al, env. Of Avnei Eitan, 1.7.1991, *A. Danin* (HUJ370747!, HUI370748!, HUI370749!), ISRAEL, Golan Heights, Nov Meadow, 1.5 km SW of Ramat Magshimim, coor: 2247/2489, alt: 410 m, herbaceous flat area, heavy basalt soil, flooded seasonally in winter and extremely dry in summer, dominance of *Hordeum bubosum* L. and *Hordeum spontaneum* C. Koch, 8.5.1994, *O. Cohen* (HUJ370753!, HUI370754!), ISRAEL, Golan Heights, near Fazra junction, 2 km E of Hushniya, ccor: 2278/2686, alt: 820 m, herbaceous flat area, heavy basalt soil, seasonally flooded in winter and extremely dry in summer, dominance of *Hordeum bubosum* L. and *Hordeum spontaneum* C. Koch, somewhat grazed by cows, 8.5.1994, *O. Cohen and U. Plitmann* (HUJ370744!, HUI370745!), ISRAEL, Golan Heights, E-Dahr, 2 km SW of Meizar, coor: 2178/2403, alt: 380 m, fallow fields and edges of cultivated fields, barren places without other plants, heavy basalt soil, 8.5.2001, *O. Cohen and U. Plitmann* (HUJ321900, HUI321901!, HUI321902!), ISRAEL, Golan Heights, 22.5.2018, *Shmuel Mazar* (HUJ134808!), ISRAEL, Golan Heights, Avnei Eitan, coor: 271321/747575, alt: 375 m, herbaceous vegetation, 18.5.2020, *Yair Ur* (HUJ134809!).

Asteraceae Bercht. & J.Presl

Atractylis mernephthae Asch. & Schweinf. & Letourn. (Fig. 1 b)

A spreading, spiny annual of the arid desert. *Atractylis mernephthae* was recorded in the Flora Palaestina from Sinai (Feinbrun-Dothan 1986), and first noticed in Israel by Shimshon Valvatker in 2024, and identified later that year by Ori Fragman-Sapir. Later, further unidentified records were found from 2010 and earlier, and even an herbarium sheet from Hatseva area by Danin from 1975, which was identified correctly in 1990 – but the new record was not published. The species is found in Israel in extreme arid environments in the Arava Valley on loamy and sandy substrates, and occurs together with *A. carduus* (Forssk.) C.Ch., and differs from the latter by the smaller, conical flowering heads without ligulate flowers, shorter outer involucre bracts, and reddish spines. It is probably somewhat more common in the Arava Valley than is currently known.

Reference material: ISRAEL, Arava Valley, near Hatzeva, Sandy wadi, 1.Jan.1975, Avinoam Danin (HUJ1002598!); ISRAEL, Arava Valley, S. Arava- E of Samar, shallow wadis, coor: 29°50'10.7"N 35°01'55.6"E, 4.Apr.2024, Ori Fragman-Sapir and Dar Ben-Natan (HUJ1002577!, HUI1002585!).

Gnaphalium uliginosum L.

A small and inconspicuous annual of vernal ponds and ephemeral wet habitats, discovered for the first time in the region and identified by Zalman Baumwoll in 2017. The species was observed growing in large numbers in wet clay mud at the bottom of a dry water reservoir in the northern Golan Heights. Further populations were reported from Birkat Ram and Orvim Reservoir. *Gnaphalium uliginosum* is a widespread species throughout northern and central Asia, Europe and North America, and is recorded in Syria and Egypt as well – making its presence in the Golan Heights unsurprising.

As there are very few natural large water-bodies in the area, the habitat in which it occurs in the region is mostly man-made, excluding Birkat Ram, which is a natural Caldera. The species was probably dispersed into the region recently by migrating birds. The local populations have been observed now for several years and seem to be stable.

Reference material: ISRAEL, Golan Heights, Bene Zefat reservoir, 3.12.2017, *Zalman Baumwoll* (HUJ1002603!), ISRAEL, Golan Heights, Bene Zefat reservoir, near hushniya, 22.12.2017, *Zalman Baumwoll* (HUJ1002612!).

***Brassicaceae* Burnett**

***Crambe alutacea* Hand.-Mazz. (Fig. 1 c)**

The species was first discovered in Israel by Shmuel Mazar in 2016, growing in orchard margins in Tel Ram, northern Golan Heights, and originally identified as *Crambe orientalis* L. (Previously reported from N Golan Heights from a single population) and reported as such in Hebrew by Mazar and Shmida in Kalanit Israel Plant Magazine (Mazar & Shmida 2016).

In 2018 plants collected from Tel Ram were examined by the genus monographer Anibal Oscar Prina, and determined as *C. alutacea* Hand.-Mazz. The plants are perennial with distinct bright yellow flowers, stellate-branched soft hairs on the leaf blades, and tuberculate upper fruit joint. Unfortunately, the small population did not survive due to the soil disturbances caused by the tillage and repurposing of the plot for agriculture, by the local farmers (Ben-Natan in Raizner & al. 2023). A few plants are grown in the Jerusalem Botanical Gardens from seed collected there and more seeds were deposited in the Israel Gene Bank.

The closely related *Crambe orientalis* is known from the Jordanian mountains. We have checked the HUJ sheaths from Jordan and in nature and discovered that although the flowers are white, the hairiness is not scabrid as known from *C. orientalis*, but soft and stellate as in *C. alutacea*. Further research is needed in order to determine the status of these populations, which might represent intermediate forms between the two species. *Crambe orientalis* was also reported from Israel, discovered in the Tel Avital's caldera (NE Golan Heights) by Bill Kunin in 1986 and observed there up till 1990 at the margins of agricultural fields (Shmida & Pollak 2007). No specimen of this population was found in any Israeli Herbaria, and the population itself has not been observed since 1990. Thus, it is impossible to determine whether these plants belonged to *Crambe orientalis* as identified originally, or to *C. alutacea* as the Tel Ram population was eventually determined. Due to the similar habitat and relatively close vicinity of the two populations, it might be more likely that the Tel Avital population belonged to *C. alutacea* as well.

Reference material: ISRAEL, Golan Heights, Mt Ram, 6.7.2016, Smuel Mazar (HUJ134851!), ISRAEL, Golan Heights, Mt Ram, 1.9.2016, Smuel Mazar (HUJ134850!), ISRAEL, Golan Heights, Mt Ram, 30.4.2017, Smuel Mazar (HUJ134852!).

Reference material of the Jordanian *C. aff. orientalis*: JORDAN, Belka, betw. El-Yaduda and Umm-El-Ámad, alt: 650 – 700 m, 26.3.1936, *A. Eig, M. Zohary, and N. Feinbrun* (HUJ134880!), JORDAN, Moav, E of Madaba, fields, alt: 770 m, 25.4.1911, *Fred S. Meyers et J. E. Dinsmore* (HUJ134881!), JORDAN, North Edom, south of Jabel Chala, South of Tafilla, alt: 1440m. In a field, 8.6.2016, *Mimi Ron and Yair Ur* (HUJ134882!), JORDAN, 20.4.2022, *Ori Fragman-Sapir* (HUJ134884!).

***Eremobium lineare* (Delile) Asch. & Schweinf. ex Boiss. (Fig. 1 d)**

Despite mentions of this taxon (as *E. aegyptiacum* var. *lineare* (Del.) Zoh.) from the Philistine Plain and the Negev by Zohary in the Flora Palaestina (1966), no correct records of this species in Israel were found in the HJ herbarium or in other local relevant sources. Sheets containing specimen previously identified by Zohary as *E. aegyptiacum* var. *lineare* (Del.) Zoh. And collected from Halutsa Sands (HJ32057!, HJ32058!), Nahal Secher Sands (HJ27534!, HJ27533!) and Wadi Nimra (HJ27535!) represent, in our opinion, small variations within *E. aegyptiacum* (Spreng.) Asch. & Schweinf. ex Boiss.

Currently, *E. lineare* is known in Israel only from a single population in Ardon Valley in Makhtesh Ramon, where it was first discovered during an INPA field survey in March 2019 by Dar Ben-Natan, Mimi Ron and Yedidya Shmuel. It is also well known from S. Jordan, especially from the Wadi Rum area. *E. lineare* is sometimes considered as a variant or a subspecies of *E. aegyptiacum*, but we prefer to consider it as a separate species due to ecological and morphological differences: *E. lineare* is characterized by bright green leaves, on which accumulates sand and silt, by wider pods that are conspicuously constricted between the seeds, and by the sub-orbicular to ovoid, disciform and conspicuously winged seeds. In contrast, *E. aegyptiacum* is grayish in color and does not accumulate dust and sand, has narrow and almost non-constricted pods, and elliptic-oblong, unwinged seeds (Khalik & Maesen, 2002). The Negev population consists of several hundred individuals, and occur on a steep, shifting sand dune, where *E. lineare* is often the most prominent, or the only plant around. In the Negev, the two *Eremobium* species are allopatric; *E. aegyptiacum* was not recorded in Ardon Valley or in Makhtesh Ramon in general - while *E. lineare* doesn't occur in other inland sands in the Negev and Arava Valley deserts, where *E. aegyptiacum* is common. Further study of populations in the Arab Desert might help to ascertain the species limits between these taxa.

Reference material: ISRAEL, Negev Desert, Makhtesh Ramon, Ardon Valley sands, on a big dune in Nahal Geled, coord: 30.6455360 N 35.0243870 E, on shifting sand in upper parts of the dune, hundreds of plants, 5.3.2019, *Dar Ben-Natan* (HJ133354!, TELA2057!), ISRAEL, Negev Desert, Makhtesh Ramon, Ardon Valley sands, on a big dune in Nahal Geled's confluence into Nahal Kamai, coord: 30.644669 N 35.022265 E, 30.645788 N 35.024910 E, 30.644484 N 35.020099 E on shifting sand in upper parts of the dune, hundreds of individuals, 7.4.2019, *Dar Ben-Natan* (HJ133358!, TELA2058!).

SINAI, Upper Wadi Zeleqa, blown up sands at base of limestone hills, 6.8.1968, *N. Tadmor* and *G. Orshan* (HJ52098!), SINAI, Wadi Feiran, 5km S of Oasis, Rocks, 6.3.1968, *A. Danin* (HJ32104!).

Caprifoliaceae* Juss.**Cephalaria setosa* Boiss. & Hohen. (Fig. 1 e)**

A slender, tall herb resembling *Cephalaria joppensis* (Rchb.) Coult., differing from it by the aristate involucral bracts and achene shape. *C. setosa* is a least known species that is very rare in the region, previously known only from one population on Mt Hermon (Wadi Arâr). It was discovered west of the Jordan River for the first time by Shimon Cohen in 2021 and further recorded and collected by Yehuda Sar-Shalom in 2023. It occurs in large quantities on the rocky slopes of Mt Kabir in the Samaria Mts, and have yet to be recorded from other locations in the area.

Reference material: ISRAEL, Mt Hermon, *Ofer Cohen* (HUJ131873!), ISRAEL, Mt Hermon, Wadi Ali, on cliff, alt: 1100m, 27.6.1971, *A. Shmida* (HUJ135065!, HUJ135066!), ISRAEL, Mt Hermon, Wadi Arár, alt: 1250m, 10.6.1991, *Hagar Leshner; Ofer Cohen and Ori Fragman-Sapir* (HUJ135067!), ISRAEL, Samaria, Mt Kabir, North of Beit Dajan, East of Elon Moreh, coor: 32.218967 N 35.365901 E, alt: 740m, Large rock terraces, facing north-east. 24.5.2023, *Yehuda Sar shalom* (HUJ!)

***Cyperaceae* Juss.**

Bolboschoenus maritimus* (L.) Palla subsp. *maritimus

A spreading, perennial herb of seaside salt marshes.

Bolboschoenus maritimus was reported in the Flora Palaestina (Feinbrun-Dothan 1985) as *Scirpus maritimus* L., mentioning *Scirpus tuberosus* Desf. and *Scirpus maritimus* ver. *tuberosus* as synonyms. This taxon, currently accepted widely as a distinct species - *B. glaucus* (Lam.) S.G.Sm. correspond well to most of the populations studied by us in Israel.

B. maritimus subsp. *maritimus* was identified locally as a distinct taxon for the first time by Bar Shemesh in 2024. The plants were found by Bar Shemesh and Noam Segev growing in the estuary saline of Nahal Na'aman in the Coast of Galilee, and a further population was recorded the same year by Bar Shemesh and Dvora Lev-Ramati in the estuary saline of Nahal Maharal in the Coast of Carmel. *B. glaucus* (Lam.) S.G.Sm. is widely common in Israel and is very similar to *B. maritimus*, differing in inflorescence shape and seed structure characteristics. It is very possible that further populations of *B. maritimus* subsp. *maritimus* will be identified along the Coastal Plain of Israel in the future.

Reference material: ISRAEL, Coastal Carmel, Ma'agan Michael, wet heavy soil, 9.5.1967, *A. Danin* (HUJ4844!); ISRAEL, Akko Plain, Na'aman saltmarsh, coor: 32°54'37.3"N 35°05'17.1"E. 16.Jun.2024, Bar Shemesh and Noam Segev (HUJ1003890!).

Bolboschoenus glaucus (Lam.) S.G.Sm.: ISRAEL, Philistean plain, Mikve Israel, near water, 3.4.1922, *A. Eig*, (HUJ 0000004952!); ISRAEL, Hula valley, 18.5.1953, *I. Baldinger* (HUJ 0000004840!), ISRAEL, Philistean plain, Palmahim, 15.3.1954, *D. Jaffe*, (HUJ 0000004945!).

***Euphorbiaceae* Juss.**

***Euphorbia dracunculoides* subsp. *glebulosa* (Coss. & Durieu) Maire (Fig. 1 f)**

A glaucous annual or perennial herb, discovered by Dar Ben-Natan, Mimi Ron and Yedidya Shmuel in Eastern Makhtesh Ramon, during a rare plants survey for the INPA. The local populations correspond to *Euphorbia dracunculoides* subsp. *glebulosa* (Coss. & Durieu) Maire, which is currently known only from NW Africa, from Morocco to Tunisia (Plants of the World Online 2024+), and is recorded here as a new taxon for Israel and for the Middle East. The local populations differ from *Euphorbia dracunculoides* subsp. *dracunculoides*, which is recorded from the neighboring Egypt and Saudi Arabia, by the obtuse inflorescence leaves, usually perennial habit, and the unique tuberculate seed coat pattern.

This species was found between 2019 and 2020 in four adjacent localities, all in sandy wadies and rocky slopes covered by sand dunes within the eastern parts of Makhtesh Ramon.

A single plant found at the margins of a sidewalk in the Negev Highlands' Field School's yard near Mizpe-Ramon in 1997, has probably arrived there with imported soil (Shmida 1997). No further records of this species exist from the region previous to 2019, and the species was listed as casual in the Red Data Book (Shmida & al. 2011). The specimen itself couldn't be located in the HJ herbarium, but a scan of the sheet shows a plant much similar to those observed in-situ in Ardon Valley – thus, the local population is a likely source for this casual appearance. Our finding in the eastern Makhtesh Ramon is the first evidence of sustained populations of this species in the region in a natural habitat.

Reference material: ISRAEL, Central Negev Desert, Makhtesh Ramon, small wadies east of Nahal Ramon, between Ardon and Mahmal Valleys, coor: 30.6231370 N 34.9294551 E, Sandy wadies, 3 young plants observed, 26.2.2020, *Dar Ben-Natan* (HJ133384!, HJ133394!), ISRAEL, Central Negev Desert, Makhtesh Ramon, Ardon Valley, small wadies and dunes over hard limestone, Nahal Geled, coor: 30.6383121 N 34.9980191 E (one plant), 30.6436709 N 35.0204089 E (10 plants), 30.642874 N 35.003174 E (seven plants), 5.3.2019, *Dar Ben-Natan* (HJ134783!)

***Fabaceae* Lindl.**

***Astragalus echinatus* Murray (Fig. 2 a)**

A prostrate annual, first discovered and identified in the region by Asaf Haim in the southern Golan Heights in 2021 in two locations, and in one further nearby location in 2024. These populations are quite dense, occurring in mostly annual vegetation on clay-rich volcanic vertisol – locally a highly endangered habitat. This discovery expands the range of this species' distribution southward by more than 300 km - from southern Turkey to the Flora Palaestina region.

Reference material: ISRAEL, Golan Heights, env of Kfar Haruv, coor: 32.764167 N 35.676093 E, alt: 300m. Heavy clay soil, 2.5.2023, *Dar Ben-Natan*, *Bar Shemesh and Asaf Haim* (HJ135084!, TELA4906).

***Geraniaceae* Juss.**

***Erodium brachycarpum* (Godr.) Thell.**

This small Mediterranean species was recorded already in the Analytical flora of Eretz-Israel (Danin & Feinbrun-Dotan, 1991) from the Golan Heights, and treated there as *Erodium botrys* (Cav.) Bertol., a closely related species that occurs in sandy and sandy clay soils in the Coastal Plains of Israel. The species was first identified correctly in Israel by Shmuel Mazar in 2018, from the Golan Heights and Upper Galilee, where it occurs sparsely on basalt clay soils in stony plains, usually near vernal ponds or shallow vernal streams. This report is the second one from the E Mediterranean and Middle East, hinting that this inconspicuous species will probably be found in other bordering countries, and in other regions in the N and S Mediterranean in future surveys.

Reference material: ISRAEL, Golan Heights, Oz military camp, 26.3.2017, *Dar Ben-Natan* (HJ133837!), ISRAEL, Golan Heights, Hushnia reserve, coor: 33.0017590 N 35.8204730 E, 13.4.2022, *Dar Ben-Natan* (HJ134804!).

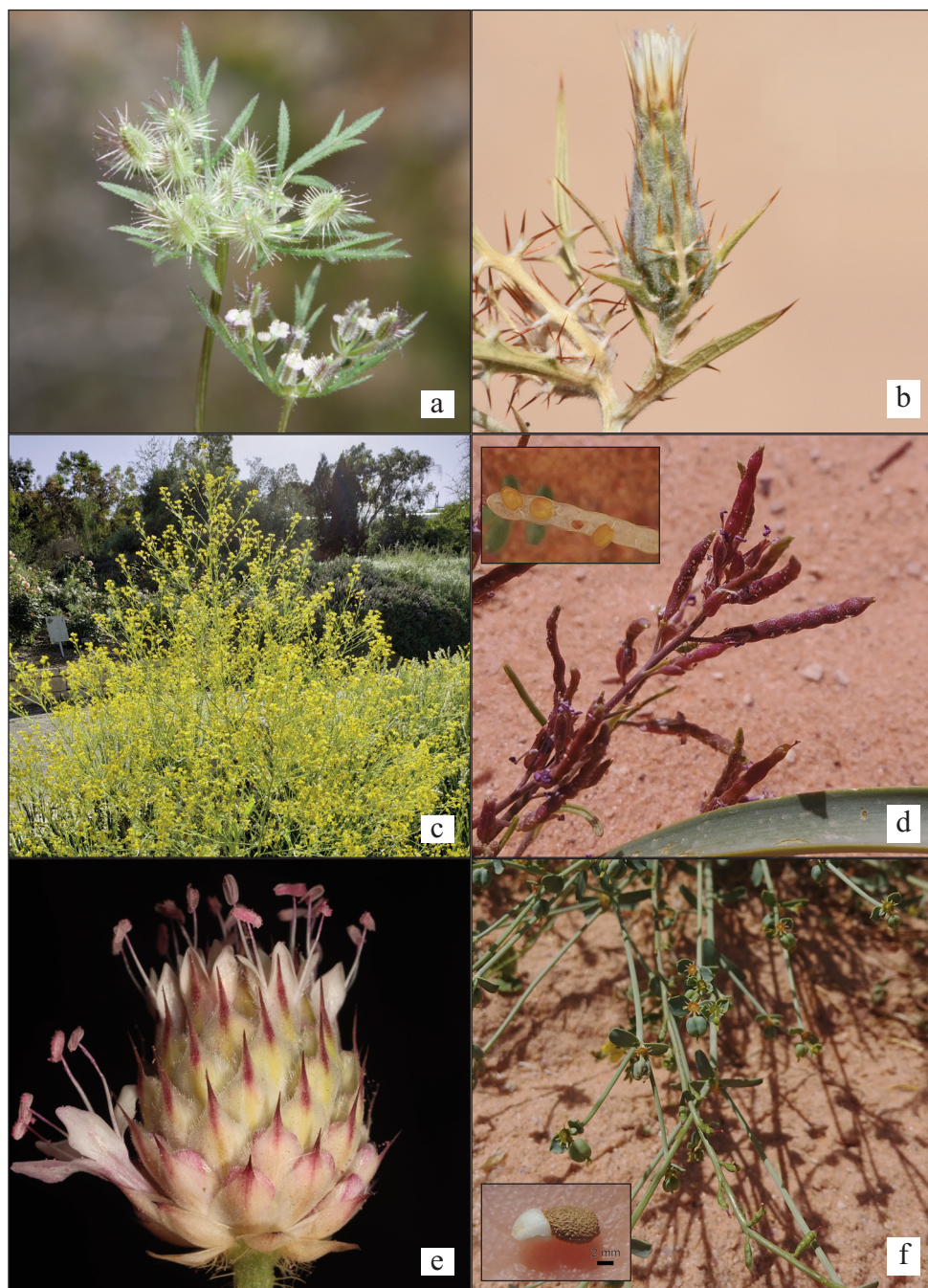


Fig. 1. **a.** *Daucus involucratus*, photo O. Fragman-Sapir; **b.** *Atractylis mernepthae*, photo O. Fragman-Sapir; **c.** *Crambe alutacea*, photo O. Fragman-Sapir; **d.** *Eremobium lineare*, photo D. Ben-Natan; **e.** *Cephalaria setosa*, photo Y. Sar-Shalom; **f.** *Euphorbia dracunculoides*, photo D. Ben-Natan.

Lamiaceae Martinov***Ziziphora persica*** Bunge (Fig. 2 b)

A small, fragrant annual herb, growing in the semi-arid regions of Israel. In the Flora Palaestina (Feinbrun-Dothan, 1977) and later publications, *Ziziphora persica* Bunge has been misidentified in Israel as *Z. tenuior* L., which occurs in higher elevations in Edom (Jordan) and in the Southern Sinai Highlands. The former species is very rare in Israel, occurring sparsely in the southern Judean Mts and the Judean Desert, growing in Batha, at the margins of traditional agriculture, and extremely rare in gravelly wadies in the Negev Highlands (Danin & Feinbrun-Dothan 1991, Shmida & Pollak 2007). The species was included in the Israeli Red Data Book of Endangered Vascular Plants (Shmida & Pollak 2007) as *Z. tenuior*, and reidentified as *Z. persica* by Bar Shemesh and Dar Ben-Natan in 2025. Currently, there is no evidence of *Z. tenuior* occurring in Israel. Although *Z. tenuior*'s presence is verified in Jordan and S. Sinai, in the HJ herbarium, records for this species in Jordan exist only from Edom (S. Jordan) – therefore, more northern populations might turn out to belong to *Z. persica* as well.

Reference material: ISRAEL, Judean Desert, 4-5 Km S of Bani Na'im, 5.4.1942, *Daniel Zohary* (HJ14701!); ISRAEL, Nahal Lotz And Nahal Elizur Junction, *Avinoam Danin*, 27.4.1966 (HJ14699!); ISRAEL, Central Negev, Borot Loz, Above Nahal Elot, *A. Danin and A. Liston*, 6.4.1983 (HJ14700!); ISRAEL, Judean Desert, Canub Ridge, Peney Kedem. Low shrubland at the edge of an olive orchard. Chalk. Alt: 930 m, 20.5.2005, *Yair Ur* (HJ1008215!); ISRAEL, Judean Mts, SE of Bnei Dar ruins, margins of agricultural fields, alt: 850 m, 23.4.2009, *Yair Ur* (HJ1008213!); ISRAEL, Judean Mts, S of Mt Hebron, S of Nebi Yakin, 13.4.2010, *Yair Ur* (HJ122456!).

Ziziphora tenuior L.: JORDAN, Edom, Ma'an to Ein Musa, roadside, 16.4.1929, *Noah Naftolsky* (HJ14719!); JORDAN, Aqaba area, sandstone hills, 3.6.1943, *K. Gliber* (HJ14721!); JORDAN, Edom, Bir Dabbaghat, near Shobak, open, heavily grazed ground on sandstone in open *Q. coccifera* scrub, alt: 1524 m, 23.6.1951, *H.J. Mooney* (HJ14723!); JORDAN, Edom, Hishe, 11 km NE of Perta, alt: 1600 m, 4.7.1997, Unknown collector (HJ12657!); JORDAN, Edom, E of Al-Hay (E of Petra), wheat fields, alt: 1480 m, 30.4.2016, *Mimi Ron & Yair Ur* (1008212!); SINAI, S. Sinai, St Katherine area, collected and grown in the botanical garden, 11.3.1975, *Shmida & Arbel* (HJ1008217!); SINAI, S. Sinai, St Katherine area, collected and grown in the botanical garden, 15.4.1975, *M. Shouat* (HJ1008218!); SINAI, S. Sinai, road from Jebel Katherine to Jebel Ahmar, 3.5 km N of St Katherine Monastery, red granite, alt: 2300 m, 1.5.1976, *Reichenstein* (HJ14724!); SINAI, S. Sinai, Wadi Tweita, 9 km WNW of St Katherine Monastery, 16.4.1979, *A. Danin*, (HJ14725!).

Limeaceae Shipunov ex Reveal***Limeum obovatum*** Vicary

This inconspicuous, spreading annual-biennial species, was first discovered in Israel in the S Arava Valley by Shimshon Valvatker in 2021, and went unidentified until 2024, when it was recorded again by Valvatker in the same locality, and identified by Ori Fargman-Sapir. The species occurs there in extreme arid desert, on sandy gravel in small, dry gulches

in alluvial fans near Timna. Currently, only two close localities are known, comprising of a small population of less than 50 individuals in total. Its closest known sites are in Egypt and Saudi Arabia, therefore it might be found in the eastern Arava Valley in Jordan as well in the future.

Reference material: ISRAEL, S. Arava, E of Timna, coor: 29°46'13.4"N 35°00'43.6"E, 14.May.2024, *Dudi Rivner and Dafna Carmeli* (HUJ1002588!).

Lythraceae J.St.-Hil.

Lythrum silenoides Boiss. & Noë (Fig. 2 c)

Tall, erect annual. This least-known species was discovered for the first time in Israel by Talia Oron and later identified by Shmuel Mazar from a single locality in the Northern Hula valley in 2019. The plants grow there in a small muddy depression near streams of fresh water, together with the rare and also newly discovered *L. thesioides* M. Bieb. A further locality was found by Hila Abraham later in the same year in Einot Bazelet in the Golan Heights, and a third locality was found by Yair Ur in the N Golan Heights in 2022. In all three localities it is threatened by grazing and groundwater levels depleting. The Hula Valley population was observed again in 2022, but the Golan Heights populations were observed only once, and might not be stable. These findings set a new western border to this species' distribution, and provide an accessible opportunity to study this rare species in the field.

Reference material: ISRAEL, Hulla Valley, Nuhaila, coor: 33.2506640 N 35.6518750 E, Wet mud in margins of a stream, in an open spot among scrub of *Rubus sanctus* Schreb., together with *Lythrum thesioides* M.Bieb., *Juncus articulatus* L., and *Euphorbia microsphaera* Boiss., tall, branched plants with a central stem reaching 1.5m, 13.8.2020, *Dar Ben-Natan* (HUJ133352!, TELA2072!), ISRAEL, Hulla Valley, Nuhaila, coor: 33.250688 N 35.651813 E wet meadow in a small streamlet, 22.9.2022, *Dar Ben-Natan* (HUJ134976!).

Lythrum thesioides M.Bieb. (Fig. 2 d)

This species is known in Israel only from one locality, where it was photographed and reported for the first time by Zalman Baumwell in 2019, and mistakenly identified as *L. thymifolium* L. Later the species was identified as *L. thesioides* by Shmuel Mazar and Dr. Antoine Gazaix.

L. thesioides is a rare, endangered species in a global scale, and in the last few decades was recorded only from S France (Dr. Antoine Gazaix, personal communication). The newly discovered population in the Hula Valley represent the first record of this species in the Eastern Mediterranean, and provides an opportunity to study an accessible population of this least-known species. This population occurs within a small clearing in a dense *Rubus sanctus* Schreb. scrub, in a wet environment at close proximity to the Dan River, and together with many wet habitat species, many of them locally rare and endangered. Among them: *Lythrum silenoides* Boiss. & Noë, *Fimbristylis bisumbellata* (Forssk.) Bubani, *Euphorbia microsphaera* Boiss., and *Juncus articulatus* L. The population was observed again in 2022, and seems to be stable.

Reference material: ISRAEL, Hulla Valley, Nuhaila, coor: 33.2506640 N 35.6518750 E, Wet mud in margins of a stream, in an open spot among scrub of *Rubus sanctus* Schreb., togeth-

er with *Lythrum silenoides* Boiss. & Noë, *Juncus articulatus* L., and *Euphorbia microsphaera* Boiss., about 9 individuals in total, branched and prostrate plants, 13.8.2020, *Dar Ben-Natan* (HUJ133347!, TELA2071!), ISRAEL, Hulla Valley, Nuhaila, coor: 33.250688 N 35.651813 E, wet meadow in a small streamlet, 22.9.2022, *Dar Ben-Natan* (HUJ134977!).

Montiaceae Raf.

***Montia fontana* L.**

A tiny annual, growing in damp muddy meadows on the margins of small streams and vernal ponds. *Montia fontana* was first discovered in Israel in 2012 by Yair Ur, in a small spring in Mt Kaka (lower Mt Hermon) on sandy clay wet mud. Since then, it was further found in several other small springs in that area, and in several localities in the northern Golan Heights, on muddy basalt clay wet soil near vernal wet habitat, mainly by Yair Ur, Oz Golan and Bar Shemesh. The Golan Heights populations might not be stable, as most of them were observed only once so far, but the Mt Kata population is stable for more than ten years already.

Reference material: ISRAEL, Mt Kata (lower Mt Hermon), coor: 33.2486530 N 35.7539940 E, herbaceous, muddy meadow at the margin of a stream, 15.3.2020, *Dar Ben-Natan* (HUJ134825!).

Plantaginaceae Juss.

***Misopates microcarpum* (Pomel) D.A.Sutton**

Misopates orontium (L.) Rafin. is quite common in northern and central Israel, extending south into the Negev Desert and east to the Judean Desert. In arid environments, this variable species creates desert forms – smaller plants with considerably smaller and paler corolla compared to Mediterranean populations. In 2024, one such population was collected by Bar Shemesh and Mimi Ron, and was identified by Bar Shemesh as *Misopates microcarpum* (Pomel) D.A.Sutton – a desert species characterized by its smaller corolla and capsule, and a unique seed coat shape. The species was found growing in rocky terrain in the northern Dead Sea area. Other populations observed previously in the southern Negev and Arava Valley are suspected as belonging to *Misopates microcarpum* as well. This species' presence in NE Egypt (Boulos, 2002) supports the possibility of a larger population extending over the Southern Negev and Sinai. The scarce records from the area might be attributed to the difficulty in distinguishing between *M. microcarpum* and the desert forms of *M. orontium*.

Reference material: ISRAEL, Dead Sea area, ascent to Ras-Fesh'ha, coor: 31°42'45.4"N 35°26'54.5"E, alt: -260 m. 5.May.2024, *Bar Shemesh* and *Mimi Ron* (HUJ1003767!).

Rubiaceae Juss.

***Galium parisiense* L.**

Following the discovery of true *G. divaricatum* Pourr. ex Lam in Israel in 2023, populations of *Galium* sp., attributed until that point to this name (Boissier 1875; Post 1896, Feinbrun-Dothan in Flora Palaestina 1978), were reidentified by Bar Shemesh as *G.*

parisiense L., a name unrecorded from the region until now. During the spring of 2023, two populations of *G. divaricatum* were discovered on sandy-clay substrates in the Sharon Plain and in the lower Mt Hermon by Bar Shemesh and Dar Ben-Natan. It is possible that further populations of the latter species will be discovered in the Coastal Plain of Israel in the future, however, the habitat in which they were found until now is highly threatened by urban expansion, afforestation, and competition with invasive plant species. *Galium parisiense* is quite common, mostly on calcareous substrates, and often in disturbed habitats, across the Mediterranean parts of Israel.

Reference material: ISRAEL, Mt Gilboa, Mar.1996, *Aviva Rabinovitz* (HUJ1006669!); ISRAEL, Upper Galilee, Kerem Ben-Zimra, roadside gravel on a grassy, rocky slope, 9.May.1984, *C. Heyn, U. Plitmann, I. Herrnstadt, B. Pazi & A. Liston* (HUJ122553!); ISRAEL, Mt Carmel, 10.Apr.1926, *Noah Naftolsky* (HUJ1006671!); ISRAEL, Shomeron, env. Of Daliya, 5.Apr.1950, *Dani Zohary* (HUJ1006672!); ISRAEL, Judean Mts, Wadi entering Nahal Arugot, Below Hirbet Kanub, rocky slope, *Sarcopoterium spinosum* (L.) Spach batha, alt: 500 m, 8.Apr.1985, *A. Liston* (HUJ1006668!); ISRAEL, Golan Heights, Nov, inundated basalt, alt: 400 m, 14.4.1985, *A. Liston* (HUJ1006667!).

Galium divaricatum: ISRAEL, Sharon Plain, Pardes-Hanna, Sandy loam hills, garigue of Calycotome, Cistus and Lavandula, 8.Apr.1946, *D. Zohary* (HUJ1006670!); ISRAEL, Sharon Plain, Illanot Forest, west of rout 4, red clay loam, in shade of *Cistus salviifolius* L., 4.Apr.2023, *Bar Shemesh and Dar Ben-Natan* (HUJ1005807!); ISRAEL, Lower Mt Hermon, Mt Kata, in a small dry wadi S of Nimrod, coor: 33°14'36.2"N 35°44'58.0"E, alt: 1050 m, brown sandy clay loam. 18.May.2023, *Dar Ben-Natan* (HUJ1005810!); ISRAEL, Lower Mt Hermon, Mt Kata, rocky hill SW of Nimrod, coor: 33°14'34.5"N 35°44'46.7"E, alt: 1040 m, in batha on sandstone. 18.May.2023, *Dar Ben-Natan* (HUJ1005809!); ISRAEL, Sharon Plain, Ilanot Forest, west of rout 4, coor: 32°17'33.1"N 34°54'07.8"E, red sandy clay loam, in shade of *Cistus salviifolius* L., 10.Apr.2024, *Dar Ben-Natan* (HUJ1005803!); ISRAEL, Sharon Plain, Ilanot Forest, east of rout 4, coor: 32°17'41.0"N 34°53'46.8"E, sandy red clay loam, 17.Apr.2024, *Dar Ben-Natan and Gal Lupovich* (HUJ1005808!).

***Ranunculaceae* Juss.**

***Consolida scleroclada* (Boiss.) Schroedinger (Fig. 2 e)**

Branched, pilose annuals, occurring in arid steppes in high elevations of southern Jordan, Syria and Lebanon, and cited by Zohary (1966, 1976) from the Central Negev Desert as well. The basis for that citation is unclear, as no material from Israel could be located in the HUJI herbarium, as well as any other kind of past records of this species' presence in the region, and it was not recorded from Israel in any earlier works (Boissier 1867; Post 1896; Eig & al. 1954). The earliest citation of its presence in Israel is in the Flora Palaestina (Zohary 1966). As no other support for this claim was found, Shmida & al. (2007, 2011) considered *Consolida scleroclada*'s occurrence in Israel as doubtful, therefore it was excluded from the Red List of Israel's vascular plants.

In a field expedition to upper Nahal Arugot (Judean Desert), Ofra Fridman, Ohad Binyamini and Avi Shmida discovered a large population of this rare species in a NW exposure above limestone cliffs, in a *Sarcopoterium spinosum* (L.) Spach batha, together with another locally

extremely rare species, new to the region and reported in our previous paper (Ben-Natan & al. 2024) – *Silene marschalii* C.A.May. The upper Nahal Arugot cliffs area is known locally as an important botanical hotspot for relic populations of locally rare species such as *Achillea falcata*, *Galium canum* Req., *Bolanthus filicaulis* (Boiss.) Barkoudah, *Ferula orientalis* L. and *Silene grisea* Boiss. These occur mainly on the cliffs below, while *Consolida sclerocrada* and *Silene marschalii* grow together with *Astragalus cretaceus* Boiss. & Kotschy in the batha developed on the slopes above. Although they are supposedly protected in the Nahal Kanub Nature Reserve, the upper slopes of this area and the several locally extremely rare species that are confined to this local habitat are threatened by constructions of the nearby village, Ibej Hanahal.

Reference material: ISRAEL, Judean Desert, Nahal Canub Reserve, near Ibei Hanahal, coor: 31.6001630 N 35.2152940 E, 31.6002730 N 35.2150880 E, 31.6003021 N 35.2154692 E, Upper part of a northern exposed slope, in a Batha of *Sarcopoterium spinosum* (L.) Spach and *Coridothymus capitatus* (L.) Rchb.f., few individuals (about five), together with *Silene marschalii* subsp. *marschalii* C.A.May and *Astragalus cretaceus* Boiss. & Kotschy, 4.6.2020, *Dar Ben-Natan* (HUJ133349!, HUI134771!).

Nigella oxypetala Boiss. (Fig. 2 f)

The species was first discovered in the region in 2018 in the southern Golan Heights by Shmuel Mazar, and identified by Miriam Milo (Mazar & al. 2018). Since, this species was further found in four areas: lower Galilee, Jezreel Valley, Shefela and S Hebron Mountains (S Judean Mts) (Shemesh 2021, Shemesh & al. 2020, Shemesh & al. 2024 [in press]). All populations occur in relatively deep clay vertisols in the context of traditional extensive agriculture or small residual patches of natural vegetation in the margins of modern agriculture – both are highly threatened habitats in Israel. Superficially, the species resembles the locally common *N. ciliaris* DC., and it might have been misidentified as it and overlooked over the years. Seeds were collected from the Golan Heights and grown in the Jerusalem Botanical Gardens and also deposited in the Israel Gene Bank.

Reference material: ISRAEL, Golan Heights, between Ramat Magshimim and Elád, 11.6.2018, Shmuel Mazar (HUJ134810!); ISRAEL, Shefela, S of Gal'on, coor: 31°37'00.0"N 34°52'04.0"E. A wash between chickpea fields. 30.Apr.2020, *Mimi Ron* (HUJ1000002!); ISRAEL, S Judean Mts, SE of Beit-Yatir, coor: 31°21'26.8"N 35°06'19.3"E, extensive agriculture in a small valley facing west, on brown clay vertisol. 1.Apr.2024, *Dar Ben-Natan* and *Bar Shemesh* (HUJ1003763!).

Discussion

The renewed interest in the diversity and taxonomy of plants in Israel have led to the discoveries of more than 60 species new to the region, previously unrecorded or mis-identified. 28 of which were reported in our previous paper (Ben-Natan & al. 2024), and 23 more are detailed here. These species were found all across the region, from the Southern Arava Valley in the south to the Upper Galilee, northern Golan Heights and lower Mt Hermon in the north. Interestingly, of these 23 species, nine occur in the Golan Heights – emphasizing the need for more surveys and research in this region.

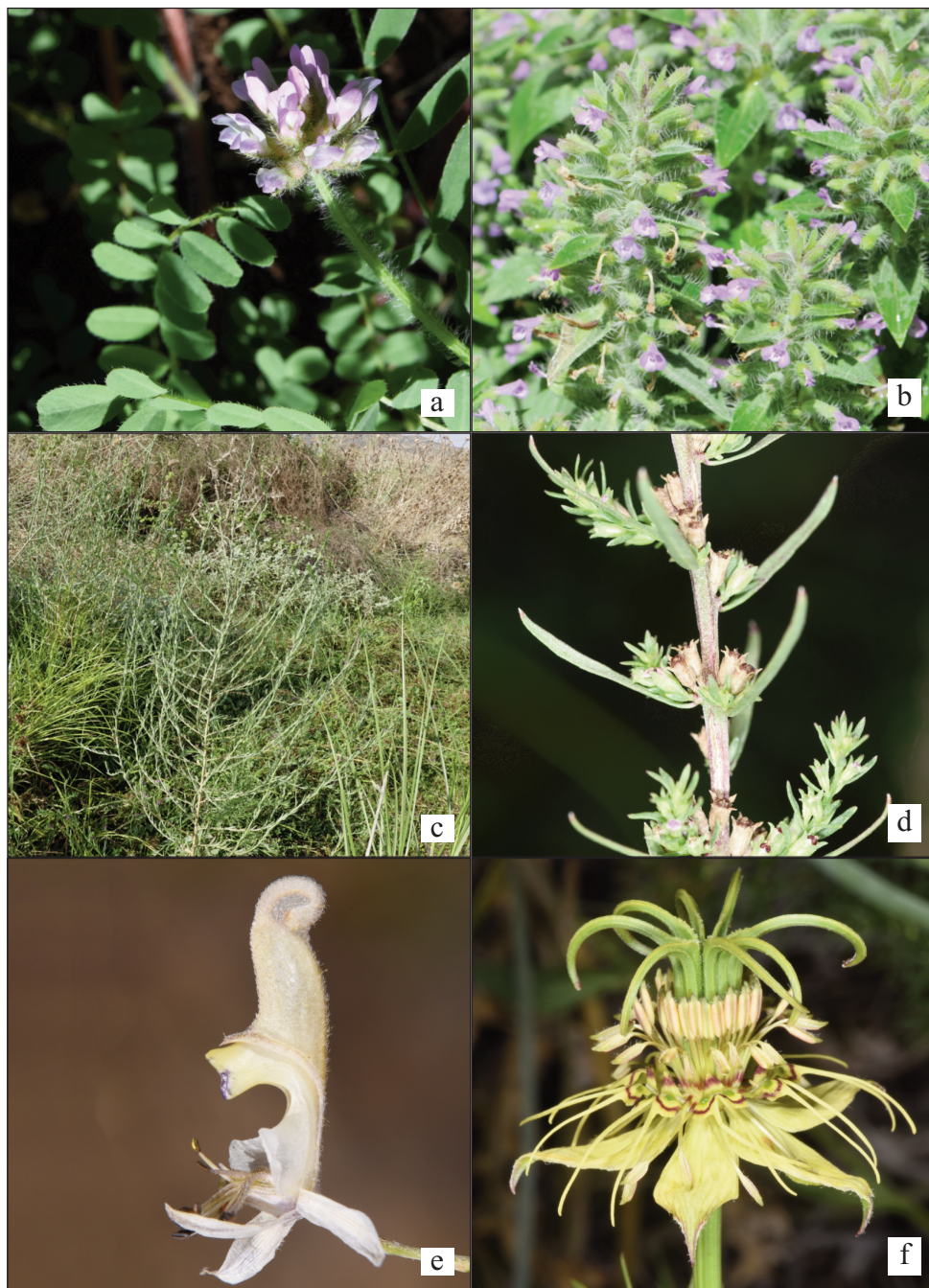


Fig.2. **a.** *Astragalus echinatus*, photo O. Fragman-Sapir; **b.** *Ziziphora persica*, photo O. Fragman-Sapir; **c.** *Lythrum silenoides*, photo O. Fragman-Sapir; **d.** *Lythrum thesioides*, photo O. Fragman-Sapir; **e.** *Consolida scleroclada*, photo O. Fragman-Sapir; **f.** *Nigella oxypetala*, photo O. Fragman-Sapir.

In accordance with the findings presented in the previous paper (Ben-Natan & al. 2024) all of the species recorded here are herbaceous, most of which (18) are annuals – further corresponding with the uniquely rich in herbaceous and particularly annual flora of the region (Fragman & al. 1999; Poppenwimer & al. 2023). The richness of annual species in many of the local microhabitats adds to the complexity and importance of their conservation.

Most of the new discoveries presented here are regarding new floristic records for the Flora Palaestina region, previously not reported from the region and sometimes familiar to local botanists and travelers from visits to bordering countries such as Jordan, Egypt and Syria (e.g., *Atractylis mernephthae*, *Limeum obovatum*, and *Consolida scleroclada*), or from the higher parts of Mt Hermon (*Cephalaria setosa*). Some of the examples presented in this paper are misidentifications of already recorded species (*Daucus involucratus*, *Galium parisiense*, *Ziziphora persica*). Few of the species recorded here (*Lythrum sile-noides*, *L. thesioides* and *Gnaphalium uliginosum*), occurring in wet habitats, are likely to have recently been bird- or wind-dispersed into the region and established new populations. Further monitoring of these populations is needed in order to ascertain whether they are self-sustained. However, most of the species presented here are local species, overlooked until now. At any rate, all of these species occur in the region at the periphery of their global range – hence the need to locally preserve them.

The findings in this paper contribute to the updated detailed checklist of the local flora (in preparation). They showcase the vast diversity that can be found in such small regions of the eastern Mediterranean, and demonstrate the importance of thorough biodiversity surveys. Habitat conservation is of great and major importance for the conservation of this plant diversity, with special emphasis on the conservation and interface of small and vulnerable ecosystems in this densely populated and densely cultivated region.

Most of the new records in this paper, belong to species that are tagged for the first time as locally endangered in Israel. The main reason for that is habitat destruction in this very small and highly populated country, especially in its Mediterranean parts. Similar plant vulnerability occurs in Mediterranean Lebanon (especially along the populated coast plain). Lower plant vulnerability occur as one leaves the Mediterranean region Israel-Lenanon and reaches the steppes and desert in Southern Israel, Syria and Jordan, that are sparsely populated.

Since 1999 (Fragman & al. 1999) no updated checklist of the local vascular plants has been published. The estimated number of species recorded from the Flora Palaestina region, including the new additions from recent years, is approaching 2700 species. Since many of the newly discovered species are extremely rare and occur in few localities, immediate actions to conserve them both in situ and ex situ are required. Many locally rare and endangered species, including many of the species discussed here, are conserved in the Jerusalem Botanical Gardens, as well as in other botanical gardens, sanctuaries and in the Israel Gene Bank.

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