

New Records for the Native Flora of the West Bank, the Occupied Palestinian Territories

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Abstract: Thirteen species which belong to eight families of vascular plants are hereby reported as new and noteworthy records from the Occupied Palestinian Territories in the West Bank. While reported elsewhere in Palestine, many provide range extensions southwards and it is relevant to report them here especially that Palestine is now recognized as a state within the 1967 borders (West Bank and Gaza) and as this can be helpful for planning purposes. These include *Alisma plantago-aquatica* L., *Damasonium alisma* Miller, *Butomus umbellatus* L., *Lactuca aculeata* Boiss. & Kotschy ex Boiss., *Scorzonera phaeopappa* (Boiss.) Boiss., *Convolvulus scammonia* L., *Convolvulus coelesyriacus* Boiss., *Stachys distans* Benth., *Salvia sclarea* L., *Securigera parviflora* (Desv.) Lassen, *Crypsis acuminata* Trin., *Crypsis alopecuroides* (Piller et Mitterpol) Schrader, and *Pteris vittata* L. Much more work remains to be done to add to the growing list of the flora of this region.

Keywords: Geographic distribution, Palestine, Flora, Range extension, Biodiversity.

Introduction

The small geographic area of Palestine enjoys diverse climates because of its geologic history (African and Arabian plate movements that resulted in high mountains in addition to hosting the lowest point on earth at the Dead Sea). This history and its presence at the nexus of the Eurasian and African continents allow this area to have

diverse habitats with floristic elements ranging from Mediterranean, Irano-Turanian, Saharo-Aindian, Coastal, Ethiopian and Sudanese flora and fauna (Soto-Berelov *et al.*, 2015). The local flora has been subject to various investigations, yet much remains to be explored including updating its presence, ecology, and the conservation status of many families and groups (Post, 1933; Zohary, 1966, 1972; Feinburn-Dothan, 1978; Zohary and Feinbrun-Dothan, 1986; Danin, 1992; Fragman *et al.*, 1999; Taifour and El-Oqlah 2017; Xu *et al.* 2020; Pahl and Qumsiyeh 2021).

More importantly, there are also many areas rarely visited by botanists in the Occupied Palestinian Territories (OPTs) such as the northern West Bank (see maps in Levin & Shmida, 2007 that show lack of data for these areas). There is an urgency for conducting similar studies because of the threats of urbanization, the intensification of agriculture, changes in land use (military zones, firing zones), changes in water management, intensified tourism, and climate change (Qumsiyeh *et al.*, 2014; Qumsiyeh and Amr, 2017; Al-Shaikh and Qumsiyeh in press).

The authors strongly believe that listing species in the West Bank and Gaza (even those previously reported in other parts of historic Palestine) is important for two reasons: 1) A more thorough geographic distribution is produced (many species for example will reach their southernmost distribution in the West Bank). 2) Palestine

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is now recognized as a state within the 1967 borders (West Bank and Gaza) and hence this can be very helpful for planning purposes and for preparing national reports for the Convention on Biological Diversity which Palestine had signed. Recent studies by (Al-Sheikh 2019) shed light on the flora of the occupied West Bank which is considered a rich biodiversity hotspot with many endemic (Cuttelod *et al.*, 2009) and rare species (Al-Shaikh and Qumsiyeh, in press). The current study is extended to report new data on some species from the West Bank to build a better knowledge base for this rich flora.

Methods

Al-Sheikh has been documenting and photographing plants in the area for the past twenty years. Data were collected via trips to the locations cited below usually in the spring over the past few years. Coordinates provided are based on the longitude and latitude based on the Global Positioning System (GPS) mapping. Altitudes are given in meters above sea level. For each species, the localities are reported and are followed by comments on status. Photographs were taken by the senior author and are from the new localities mentioned unless stated otherwise. The species were identified from literature (e.g., Feinbrun-Dothan 1978; Feinbrun-Dothan and Danin 1991) including certain monographs referring to particular groups (e.g., for *Convolvulus*, see Scotland *et al.* 2015). Locality data were compared with data from Danin (2015), flora.org.il and GBIF (Horvitz and Danin 2015). However, the latter include many amateur reports not confirmed by botanists; also some of the coordinates did not match. Comparisons are also noted with the nearby Jordan (Al-Eisawi 2013; Taifour and El-Oqlah 2017; though the number and status of the taxa are not certain). Original herbarium specimens were deposited at the National Agricultural Research Center (NARC)/Ministry of Agriculture. Also, duplicate specimens that are listed under each species are preserved in the Palestine Institute for Biodiversity and

Sustainability, Bethlehem University, and are labeled as PMNH-Hxxxx (which refers to Palestine Museum of Natural History-Herbarium). Unless otherwise indicated, one specimen of each species is preserved at NARC and one at PMNH-H.

Results

The results of this survey confirm that thirteen taxa in eight families are hereby recorded in the area of the West Bank which were either not reported earlier or were dubious and now confirmed as present in this contested part of Palestine.

Alisamataceae

Alisma plantago-aquatica L., Figure 1A
PMNH-H00244, Arraneh, Jenin Governorate, N: 32° 30.606/ E: 35° 20.155; Alt 199 m; 27 March 2017

An aquatic or semi-aquatic perennial, 40-80 cm. Leaves long petiolate with blade elliptical-ovate, subcordate at base. Flowers disposed on a pyramid-shape inflorescence, taller than the rest of the plant, white flowers, up to 15 mm in diameter. Petals and sepals are in threes; there are six stamens and numerous Fl. March-September. Hab. small rock Ponds filled with rainwater.

This species is listed on the local red list (Sapir *et al.*, 2003) and is found in the extreme north in Lake Hula, Upper Galilee and Jabal Alshaikh (Mt. Hermon) (<https://flora.org.il/en/plants/ALIPLA/>). The record provided through this study is far to the south of these localities and is the first record in the West Bank.

PMNH-H00257; Sanour Plain, Jenin Governorate; N: 32° 21.944/ E: 35° 16.054; Alt. 356 m; 24 July 2020

Annual, 10-40 cm. Leaves long petiolate 3-8 cm. ovate-oblong, cuneate at the base. Scapes longer than leaves, whorls few, 5-7 flowers. Petals white, yellow at base. Fl. April-June. Habitat site of inundated in winter.



Figure 1. A. *Alisma plantago-aquatica* L., B. *Damasonium alisma* Miller; C. *Butomus umbellatus* L.; D. *Scorzonera phaeopappa* (Boiss.) Boiss.

Damasonium alisma Miller, Figure 1B

This species is noted to be spread in the Mediterranean Zone and has been reported as rare in the Samaritan mountains (Danin 2004) but no specific localities were given. Its ecology here like elsewhere is in moist areas that get flooded in winter but dry fairly quickly, and once semi-dry, the plants grow quickly and usually are not seen by August.

Butomaceae

Butomus umbellatus L, Figure 1C

PMNH-H00252; Sanour, Jenin Governorate; N: 32° 21.944/ E: 35° 16.054; Alt. 356 m; 24 July 2020.

Aquatic perennial, 40-150 cm. Thick creeping rhizome. Scape terete longer than leaves. Leaves basal rosette, erect, linear, 3-10 mm broad. Inflorescence, terminal, umbel-like with many flowers. Flowers showy, 2-2.5 cm in diameter. Petals obovate, pinkish-white. Sepals smaller than petals. Fl.

April-June. Habitat site inundated in winter as a temporary pond.

Reported in the Hula Basin and the Sharon Plain, and very rarely in the Marj Ibn Amer area (Esdraelon) (Danon 2004). The species prefers moist habitats; perhaps, this is why the researchers found it in the area of Sanour (a valley that gets flooded in winter).

Asteraceae (Compositae)

Lactuca aculeata Boiss. &Kotschy ex Boiss.

PMNH-H00246; Mikhmas intersection (roadside) from the road of Jaba'-Nablus, Ramallah Governorate; N: 31°87.550 /E: 35°26.692; Alt 588 m; 20 Aug 2019

Annual up to 100 cm tall. Stem whitish, glabrous or hispid. Stem leaves 3-9 cm long, 1.5-3.5 cm wide, entire, sinuate-dentate, attenuate or auriculate, glaucous on both surfaces. Inflorescence paniculate, with many heads. Peduncle hispid or glandular below heads, covered with bracts. Corolla ligulate yellow. Achenes 7.5 mm long, pilose, brown,

ribbed, with a filiform beak. Pappus of simple bristles, white, at least 3.5 mm long. Fl. May-August. Hab. disturbed habitat.

It was reported by Danin (2004 and <https://flora.org.il/en/plants/LACACU/>) in the Hula and the Golan (Occupied Syrian Territory) and Baharav et al. (2018) added detailed distribution maps in northern Palestine and the occupied Golan Heights. It is also recorded in Jordan (Kik et al. 2017; Taifour and El-Oqlah 2017). This is the southernmost record of the species in historic Palestine and the first in the West Bank, Occupied Palestinian Territories (OPTs). *Lactuca tuberosa* Jacq., and *L. viminea* are more common (Al-Sheikh and Mahasna, 2016).

Scorzonera phaeopappa (Boiss.) Boiss.,
Figure 1D

PMNH-H00256; Faqoua', Jenin Governorate; 32° 29.763 /E: 35° 24.410, ALT 388 m, 20 March 2018 North facing hillside, mixed plants with olive groves.

Perennial herb, 20-45 cm. Stems erect, scape-like. Radical leaves erect linear, 2-5 mm broad. Peduncles one-headed. Flowering heads 3-4.5 cm in diameter. Involucre densely ciliate near apex. Florets pink, longer than involucre. Achenes glabrous, striate in the lower third. Pappus long as achene. Fl. April-May. Habitat characterized by Terra Rosa soil between limestone outcrops.

It was recorded by Danin (2004) and in <https://flora.org.il/en/plants/SCOMUL/> as *S. multiscapa*. Zaika et al. (2020) provided taxonomic revisions. It is found in the Upper Galilee where it is more common than the nearby area of Mount Gilboa (Jebel Jalboun) and Esdraelon Plain (Marj Ibn Amer). The species occurs in similar habitats of hedges near olive groves in Jordan (Al-Eisawi 2013). This is its southernmost record and the first in the OPTs. *Pseudopodosperrum (Scorzorena) paposa* is more common and was reported in places such as Wadi Quff (Al-Sheikh and Mahasna, 2016)

Convolvulaceae

Convolvulus scammonia L., Figure 2A

PMNH-H00251; Wadi Balat, Nablus-Ramallah Road, Ramallah Governorate; 1 km West Wadi Haramiya spring; N: 31° 59.889/ E: 35° 14.367; Alt 601 m; 17 May 2016 Roadside.

Glabrous perennial herb. Stems 30-100 cm. Leaves petiolate, entire, triangular, hastate at base, upper leaves sometimes linear, petiole about as long as blade or shorter. Flowers axillary. Sepals glabrous, unequal, inner sepals longer than outer sepals. Corolla pale yellow, 25-40 mm, purplish stripes on outside. Fl. April-June. Hab. hedgerows with Terra Rosa soil.

Convolvulus scammonia is found in Jordan where it is also used as a medicinal plant (Al-Eisawi 2013; Oran and Al-Eisawi 2014; Taifour and El-Oqlah 2017). This species was documented by Danin (2004 and <https://flora.org.il/en/plants/CONSCA/>) as common in upper Galilee and Mt. Carmel but more rarely encountered elsewhere in the north of the country (Feinburn-Dothan 1978). Danin (2004) mentions "Samaria" (northern mountains north of the West Bank) but does not give specific locality records. *C. siculus* L. is more common than *C. scammonia* and *C. coielesyriacus* and was earlier reported in places like Wadi Quff (Al-Sheikh and Mahasna, 2016).

Convolvulus coielesyriacus Boiss., Figure 2C

PMNH-H00245, Bardeiba, Yasseed, Nablus Governorate, 32° 17.454 /E: 35° 17.533, Alt 571 m, 3 April 2015, south facing slope, grazing area.

Annual herb, 15-40 cm, branched from base. Stems decumbent or ascending. Leaves petiolate, lower ones are cordate at base. Flowers solitary in leaf axils. Sepals covered with spreading hairs. Corolla 15-20 mm, pink. Fl. March-May. Hab. phrygana and in olive groves.

It is reported in Jordan (Al-Eisawi 2013; Taifour and El-Oqlah 2017) and in the studied area as common in upper Galilee and Mt. Carmel, but more rarely encountered elsewhere in the north of the country (Danin 2004 and <https://flora.org.il/en/plants/CONCOE/>). This is also the southernmost record in Palestine.

Lamiaceae (Labiatae)

Salvia sclarea L Figure 2B

PMNH-H00247, Jaba', Jenin Governorate, N 32° 19.032'/E 35° 15.071', Alt 456 m; 30 June 2020. PMNH-H00248, Burqa, Alqosour, Nablus Governorate, N 32° 18.410'/E 35° 12.142', Alt. 654 m; 30 April 2012.

Perennial aromatic herb, 40-100 cm, covered with long hairs. Stems erect ending with narrow panicle. Leaves rugose, 8-15 cm, broadly ovate, cordate at base, cauline leaves long petiolate, the upper most sessile. Corolla purplish-pink or pale blue, 2-3 times as long as calyx. Verticillasters 2-6 flowers. Calyx campanulate, about 10 mm, Fl. May-June. Habitat: high sunny mountains.

Salvia sclarea was reported from the upper Galilee and the Golan (occupied Syrian territories) in batha among rocks (Danin 2004 and <https://flora.org.il/en/plants/SALSCL/>). Many species of *Salvia* were reported in the study region, but for this species, it is the southernmost distribution noted in historic Palestine. The species was not reported in Jordan in the checklist of Al-Eisawi (2013), but was reported by Oran and Al-Eisawi (2014) and by Taifour and El-Oqlah (2017).

Stachys distans Benth. Figure 2E

PMNH-H00249, Deir Ibzi', Ain Bubein, Ramallah Governorate, N: 31° 55.146'/E: 35° 07.743', Alt 551 m, 10 July 2012.

Perennial herb, 30-100 cm, branched above base, flowering stems with long internodes. Leaves 2-4 cm, oblong-lanceolate, dentate, lower leaves petiolate, upper leaves sessile,

Verticillasters few to many flowers. Corolla about 10 mm, white. Fl. May-June. Hab. rocky places in garigue.

Danin (2004 <https://flora.org.il/en/plants/STADIS/>) reported this species in the north of Historic Palestine especially found in higher frequency in Upper and coastal Galilee in garigue and maquis rocky habitats. He noted it as rare in the Judean Mountains. This is the first record in the northern West Bank of the species. The species was not reported from Jordan in the checklist of Al-Eisawi (2013) but was reported in the checklist of Taifour and El-Oqlah (2017).

Papilionaceae

Securigera parviflora (Desv.) Lassen, Figure 2D

PMNH-H00250, Um Al-Tut Nature Reserve, Jenin Governorate; N: 32° 26.03'/E: 35° 20.34'; Alt 257 m, 18 March 2018.

Annual glabrous herb, 10-40 cm. Stems erect or procumbent, branching from base. Leaves 3-12 cm, leaflets 7-13 pairs, oblong-obovate, mucronulate at apex. Racemes 4-7 flowers. Calyx minute, Corolla 3-4 times as long as calyx, yellow. Pod 4-7 cm, narrow linear, semicircular, thickened at joints. Fl. March-April. Hab. degraded phrygana.

Securigera parviflora was reported in the Galilee and northwestern and western (coastal) areas of historic Palestine in Mediterranean woodland and shrub lands (Danin 2004 and <https://flora.org.il/en/plants/SECPAR/>). These specimens were observed in Batha habitats in the north facing the slope of Um Al-Tut protected area. The species was not reported from Jordan yet, but is believed to occur there based on habitat availability.

Poaceae (Gramineae)

Crypsis acuminata Trin.

PMNH-H00254, Sanour, Jenin Governorate, N 32° 21.709' E 35° 15.398', Alt. 357 m, 24 June 2018.

Annual herb, 15-30 cm, branched at base, sheaths narrowly membranous-margined, sometimes fringed with hairs. Panical terminal spike-like, narrowly cylindrical, dense, bristly, remote from uppermost leaves after flowering. Glumes membranous, slightly hairy margins, lower glume narrower than the upper glume. Palea, two-veined, shorter than lemma. Fl. May-August. Hab. sites inundated in winter.

According to Danin (2004 and <https://flora.org.il/en/plants/CRYACM/>), this species is “rare in Samaria,” but no actual records are given, so the researchers think this record is

worth-noting from Sanour, an area that gets flooded after the rains, and dries into mud flats in the summer.

Crypsis alopecuroides (Piller et Mitterpol) Schrader

PMNH-H00253, Sanour. Jenin Governorate, N: 32° 21.709 /E: 35° 15. 398; Alt. 357 m; 24 June 2018.

Annual herb, 3-20 cm, branched at base. Leaves flat, with cylindrical sheaths narrowly membranous-margined, terminal spike-like, narrowly cylindrical, several times longer than broad, very dense, enveloped

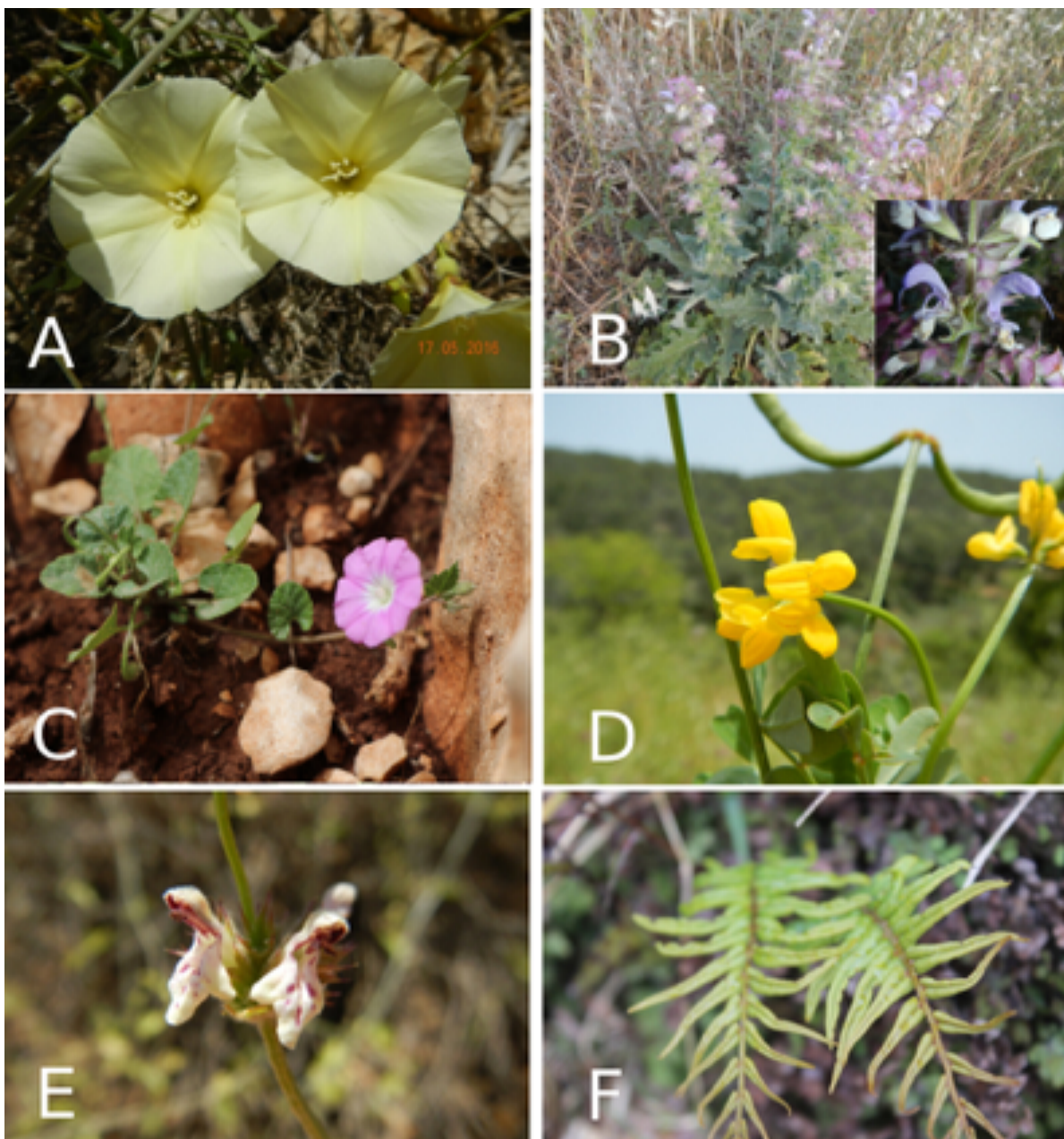


Figure 2 A. *Convolvulus scammonia* L.; B. *Salvia sclarea* L.; C. *Convolvulus coelesyriacus* Boiss.; D. *Securigera parviflora* (Desv.) Lassen; E. *Stachys distans* Benth; F. *Pteris vittata* L.

in uppermost sheath only at the beginning of flowering. Glumes hispidulous at keel. Upper glume longer and broader than the lower. Pelea two-veined. Fl. May-Oct. Hab. sites inundated in winter.

According to Danin (2004 and <https://flora.org.il/en/plants/CRYALO/>), this species is found in the occupied Golan heights and Mt. Hermon, but is rare in "Judean hills". However, no actual records are noted in the latter area, so the researchers believe this record is worth mentioning from Sanour in the northern part of the West Bank (an area that gets flooded after the rains and dries into mud flats in the summer). The researchers doubt the species' presence in the southern areas.

Pteridaceae

Pteris vittata L., Figure 2F

PMNH-H00255, Ain 'Oleim, Beita Al-Fouqa, Nablus Governorate, 32° 26' N 25° 49' E; Alt 762 m, 29 March 2019.

A terrestrial perennial fern, 30-100 cm. Rhizome creeping, covered with brown scales. Leaves densely tufted, pinnate 3-10 cm, opposite, linear, subsessile, all pinnately nerved with simple veins. Sporangia surrounded by sterile filaments. Fl. March-August.

According to Danin (2004, and <https://flora.org.il/en/plants/ptevit/>), this species is reported in the far north of Palestine (upper Galilee, Hula area, and Kinrot Valley near Lake Tiberias). The current record for the species is the furthest southwards to be reported and is the first in the West Bank.

Discussion

The latest checklist of the species of vascular plants in the West Bank listed 1612 species which belong to 117 families (Al-Sheikh 2019). Here in, this study reported thirteen more species to add to this list and many of

those represent significant range extension to the south and are the first records in the West Bank. The nearby Kingdom of Jordan has 2543 species (Al-Eisawi 2013; 2531 species per Taifour and El-Oqlah 2017), but this number is debated and needs updating. Historic Palestine has 2750 species in 138 families (Danin 2004). Both sides of the Jordan valley thus have a rich floral assemblage due to the region's geologic history that created a varied topography and climate, including having the lowest point on earth at the Dead Sea, some elevated mountains on both sides of the Jordan Valley, and a diversity of arid and moist regions. Furthermore, the geographic location allows for the penetration of the Ethiopian/Sudanese flora through the Great Rift Valley. This paper and others published show that much remains to be explored. This becomes more urgent especially that diversity is unfortunately threatened by anthropogenic effects in the region of Palestine by the colonial Israeli activities (Qumsiyeh and Abusarhan, 2020; Qumsiyeh and Albardeya, in press). The current study shows rare plants (found in single localities (twelve species in the West Bank) or at best two localities (*Salvia sclarea*). A recent study actually shows that even though about a third of the plant species of the West Bank is quite rare, and is found in very few localities, it is subject to damaging human impacts (Al-Shaikh and Qumsiyeh in press).

Conclusion

Such studies of the extension of ranges and notes on the ecology and habitats of plants are highly needed for a better planning and conservation measures. Much more can be done and is being done to protect the fauna and flora of this historic land (EQA 2015; Qumsiyeh *et al.* 2017). The researchers also encourage more studies similar to this one to understand the fauna and flora of the OPTs which have been neglected in light of political and social challenges. Palestine as a nascent state should first revise the key plant areas (KPAs) based on most up-to-date data,

and then incorporate the most recent data for a more proper management especially in nature reserves and other KPAs where the researchers found many of the above-mentioned taxa.

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