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New reports of lichens from Mawat and Gapelon districts in northeastern Iraq

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As a result of lichenological fieldwork in Mawat and Gapelon locations in the northeast of Iraq, a total of 22 lichens were identified from nine different localities. *Acarospora epiaspicilia*, *Acarospora murorum*, *Aspicilia contorta subsp. hoffmanniana*, *Caloplaca saxicola*, *Caloplaca xantholyta*, *Caloplaca oblongula* , *Candelariella coralliza*, *Immersaria cupreoatra*, *Immersaria usbekica*, *Lecaimmeria qinghaiensis*, *Lecania polycycla*, *Lecanora gangaleoides*, *Lepraria membranacea*, *Lobothallia radiosa*, *Lobothallia recedens*, *Parvoplaca tiroliensis*, *Physcia stellaris*, *Physconia grisea* subsp. *algeriensis*, *Rinodina ascociscana*, *Rinodina calcarea*, *Rinodina oleae*, *Tephromela atra* var. *calcarea* were reported for the first time from Iraq. The substrata and their collecting localities of the newly recorded lichens are presented.

Keywords: *Immersaria*, Iraq, *Lecaimmeria*, *Lobothallia*, new records

This study presents the new and noteworthy findings of lichens from Iraq continuing the series of publications on the same field (Steiner 1921, Schubert 1973, Galun and Garty 2001, Şenkardeşler et al. 2014, Aziz and Qadir 2016, Almola et al. 2017, Karim et al. 2021). Karim et al. (2021) recorded 236 species of lichens in Iraq, the majority of which were located in northeastern Iraq. The species of lichens recorded to date mostly belong to the crustose type of lichens. Despite previous surveys in northeastern Iraq, the exploration of lichens in the region is far from complete and several ecologically interesting habitats are yet to be investigated. In such an attempt, this study has been carried out to explore the lichen diversity in northeastern Iraq. These sites are located in the Mawat and Gapelon districts located 35°54′14″N, 45°24′56″E and 35°47′52″N, 45°21′8″E respectively, near the Iranian border (Azizi et al. 2013). The area is characterized by deep, dramatic cliffs and gorges, calcareous bedrock, rocky mountain slopes comprising mixed oak woodlands and grassland habitats. A wide variety of habitats provides numerous niches for lichen biota. Furthermore, the climatic conditions are characterized by cold snowy winters and very hot dry short summers, with a temperature range of −3°C to 38°C, a mean annual rainfall is around 500 mm, and mean annual humidity of 63%.

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Our study revealed huge and diverse collections of lichens including records of species new for the country and noteworthy reports at the regional level that are presented here. All recorded taxa are new for Iraq.

Material and methods

This study is based primarily on specimens collected in December 2020 and follow up surveys carried out in 2021 during field trips in the northeastern part of Kurdistan region of Iraq, Mawat and Gapelon districts (Fig. 1). The specimens were morphologically examined by standard stereomicroscope and compound microscopic with standard identification methods (Gaya 2010, Westberg and Sohrabi 2012, Nimis and Martellos 2016, Jason 2019, Xie et al. 2022). All specimens cited here were determined, revised or confirmed by the author and verified by Dr Mohammad Sohrabi from Iran. The voucher specimens are preserved at the herbarium of Halabja Technical College of Applied Science, Suliamani Polytechnic University in Sulaimanya (SPUH).

Results

Species list

Acarospora epiaspicilia Cl. Roux & M. Bertrand
Habitat and distribution: on stones around Gapelon District.

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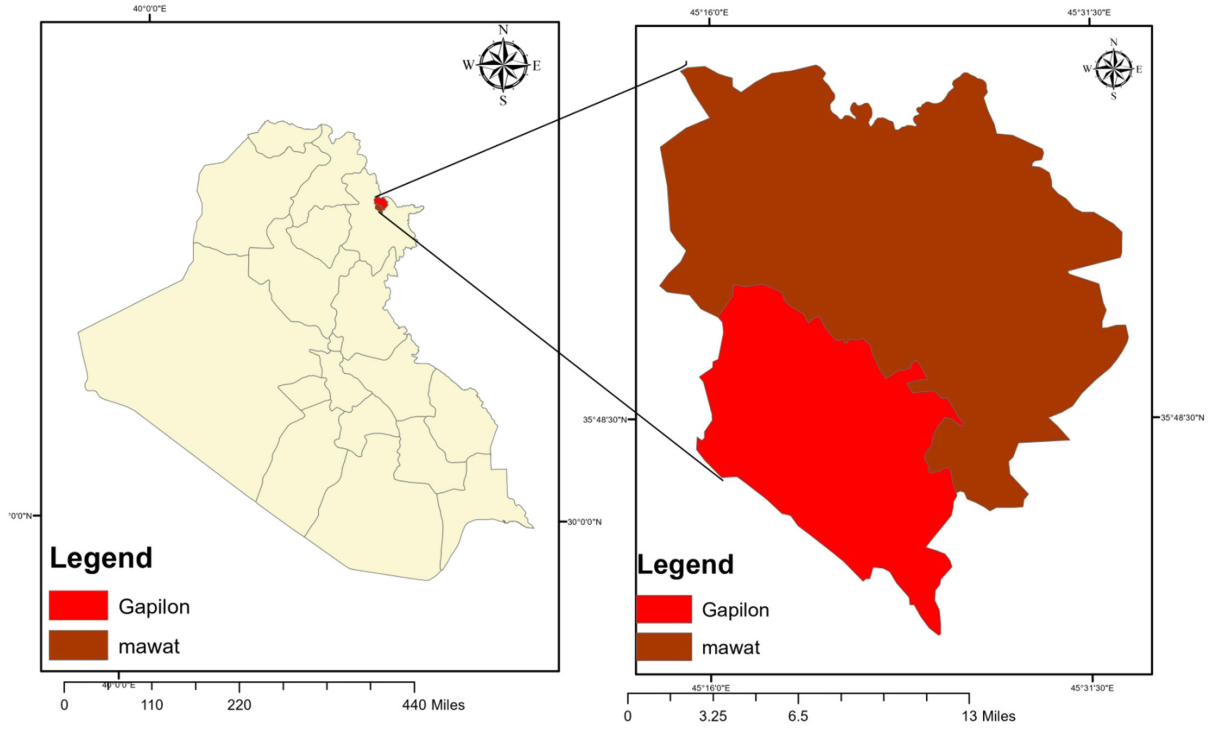


Figure 1. Map of Iraq showing Gapelon and Mawat areas.

Acarospora murorum A. Massal. Mem. Lichenogr
Habitat and distribution: on rocks near Mawat District.

Aspicilia contorta subsp. *hoffmanniana* S. Ekman & Fröberg
Habitat and distribution: on rocks in Banala village (Mawat).

Caloplaca saxicola (Hoffm.) Nordin
Habitat and distribution: on rocks in Kane Mew (Gapelon).

Caloplaca xantholyta (Nyl.) Jatta
Habitat and distribution: on calcareous sandstone in shaded and moist places stones near Maluma village (Gapelon).

Caloplaca oblongula (H. Magn.) Wetmore
Habitat and distribution: on calcareous sandstone in shaded and moist places stones near Maluma village (Gapelon).

Candelariella coralliza (Nyl.) H. Magn
Habitat and distribution: on siliceous rocks, open habitats near Brazade (Gapelon)

Immersaria cupreoatra (Nyl.) Calat. & Rambold
Habitat and distribution: on old rocks in Maluma village (Gapelon) (Fig. 2B).

Immersaria usbekica (Hertel) M. Barbero, Nav.-Ros. & Cl. Roux
Habitat and distribution: on calcareous rocks in Maluma village (Gapelon) (Fig. 2A).

Lecaimmeria qinghaiensis C.M. Xie & Li S. Wang.
Habitat and distribution: on rocks in Maluma village (Gapelon) (Fig. 2C).

Lecania polycycla (Anzi) Lettau
Habitat and distribution: on stones, around Kele village (Mawat).

Lecanora gangaleoides Nyl.
Habitat and distribution: on rocks in Kele (Mawat).

Lepraria membranacea (Dicks.) Vain.
Habitat and distribution: in shaded area on rocks with moisture places in Bazaro village (Mawat).

Lobothallia radiosa (Hoffm.) Hafellner
Habitat and distribution: on rocks around Mawat. (Fig. 2D)

Lobothallia recedens (Taylor) A. Nordin, Savić & Tibell
Habitat and distribution: in wetted places on siliceous rocks in Zhazhle village (Mawat) (Fig. 2E)

Parvoplaca tiroliensis (Zahlbr.) Arup, Søchting & Frödén
Habitat and distribution: mainly on oak tree bark in Bazaro (Mawat).

Physcia stellaris (L.) Nyl.
Habitat and distribution: on bark of tree in Kona mase (Gapelon).

Physconia grisea subsp. algeriensis (Flagey) Poelt
Habitat and distribution: on oak tree bark at Kele village (Mawat).

Rinodina ascociscana (Tuck.) Tuck.
Habitat and distribution: in mixed deciduous forest at Awkurte (Mawat).

Rinodina calcarea (Hepp ex Arnold) Arnold
Habitat and distribution: on the top of sun-exposed, limestone and calcareous at Banala (Mawat).

Rinodina oleae Bagl.
Habitat and distribution: on the bark of tree in the forest at Awkurte (Mawat).

Tephromela atra var. *calcarea* (Jatta) Clauzade & Cl. Roux
Habitat and distribution: on rocks at Garade (Gapelon) (Fig. 2F).

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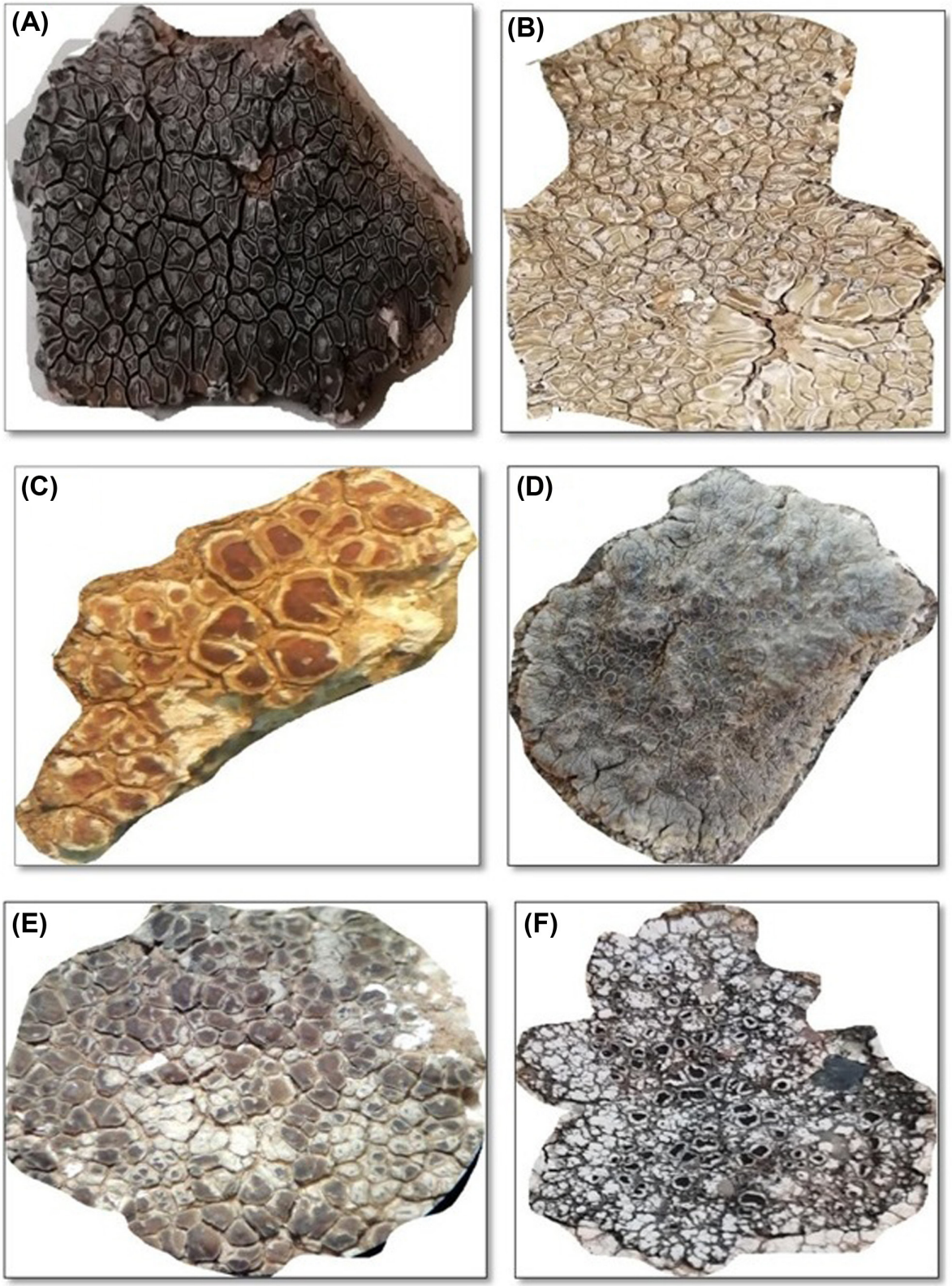


Figure 2. (A) *Immersaria usbekica*, (B) *Immersaria cupreoatra*, (C) *Lecaimmeria qinghaiensis*, (D) *Lobothallia radiosa*, (E) *Lobothallia recedens*, (F) *Tephromela atra* var. *calcarea*.

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Data availability statement

There are no additional data for this publication.

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