

RECORDS OF LICHEN SPECIES FROM GENUS ACAROSPORA, NEW FOR SERBIA, SOUTHWEST BALKAN PENINSULA

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ABSTRACT

The lichens: *Acarospora impressula*, *A. nitrophila*, *A. nodulosa*, *A. schleicheri*, *A. sinopica*, *A. smaragdula* and *A. umbillicata*, collected in North Kosovo are reported as a new species to Serbia, following a recent lichenological survey. Location, herbarium deposits and substrates are given, together with notes on distribution of the reported taxa.

Keywords: Lichens, New records, Biodiversity, Genus *Acarospora*, R. Serbia.

INTRODUCTION

Lichens biota are not well investigated in Republic of Serbia. A compilation of the greatest part of lichenological investigations in former Yugoslavia that includes the investigated area, was presented by Kušan. Kušan's work includes data from 1926 from Androssovsky and Szatala, who recorded 67 lichen species in the region of Kosovska Mitrovica (Kušan, 1953). Studies of lichens were carried out in the area of Kosovska Mitrovica during 1983, concluded "lichen desert" (Bejtullahuet al., 1983), while in 1988 the effects of polluted air on the lichens development in the same area (Murati et al., 1988) were investigated. The most complete contribution to lichens biota for the territory of the former Yugoslavia gave Murati (1992). Savić gave the data of lichen diversity in former Yugoslavia, researched the lichens in the mountain of Kopaonik (1996), investigated changes of the composition of epiphytic lichens in Belgrade area (1998a) and noted the presence of 43 taxa of lichens in Belgrade (1998b). The lichens were used as air pollution bio indicators in Belgrade area (Cvijan et al., 1997). The "lichen desert" boundaries changes in Belgrade has been monitored, compering the results of the research from 1980/81, 1991 and 2007 (Cvijan et al., 2008). The lichens of N.P. "Kopaonik" (Dimović & Jokić, 2000) and lichens of Radan Mountain (Dimović, 2001) has been investigated. "Checklist of the lichens of Serbia" contains 586 species. This checklist also contains a list of synonyms and faults records (Tibell & Tibell, 2006). Epiphytic lichens have been used as indicators of the air quality in the urban part of Pirot city (Djekić et al., 2017). In the town of Zvečan epiphytic lichens have been investigated and their bio indicators value (Aleksic et al., 2019). Recently, the articles were published on records of lichenicolous fungi new for Turkey and Asia (Yazaciet al., 2019) and on lichens species new to Ukraine (Khodosovtsev & Darmostuk, 2020).

According to our literature survey, all six taxa presented in this work we register for the first time within the territory of Serbia, including Kosovo (Tibell & Tibell, 2006; Mayrhofer et al., 2016). According to available data, it was the first lichen investigation at these sites (Tibell & Tibell, 2006).

MATERIALS AND METHODS

Study area

Lichen investigation was performed from October 2016 to January 2023, in the North part of Kosovo, i. e. Serbia,. In Zvečan 42°54'15.5"N, 20°50'47.36"E, alt. 700 m, Banjska (municipality Zvečan) 42°58'22.3"N, 20°46'57.0"E, alt. 547 m, Jagnjenica (municipality Zubin Potok) 42°55'14.4"N 20°45'29.0"E, alt. 680 m and Jarinje (municipality Leposavić) 43°13'17.3"N 20°42'02.7"E, alt. 480 m (Fig. 1).

North Kosovo zone has suitable habitats for lichens existence. The study area has various outcrops (granite, sandstone and limestone) as well as different type of woody plant species. The territory has agricultural landscape spatially.

Generally, about 83 % of the territory of Kosovo is characterized by humid climate and the rest of the territory is characterized by the semi-humid climate which is specific for the central part of the region and very-humid in the southwestern part of region. The spring is dominated by semi-humid climate 23.0. During the winter, values of indexes vary from 11.0. to a maximum of 28.0. As can be seen, most of Kosovo has humid conditions, except for small isolated area in the central part of Kosovo where is climate semi-humid. The summer season is mostly dominated by semi-arid climate conditions with values ranging from 10.0. to 20.0. Only parts of the south-western area are extremely humid. This season is the driest, based on average values of the indices, compared to the winter, spring and autumn values. Finally, the autumn is characterized by the humid but not very humid conditions >30.0. (Bačevićet al. 2017).

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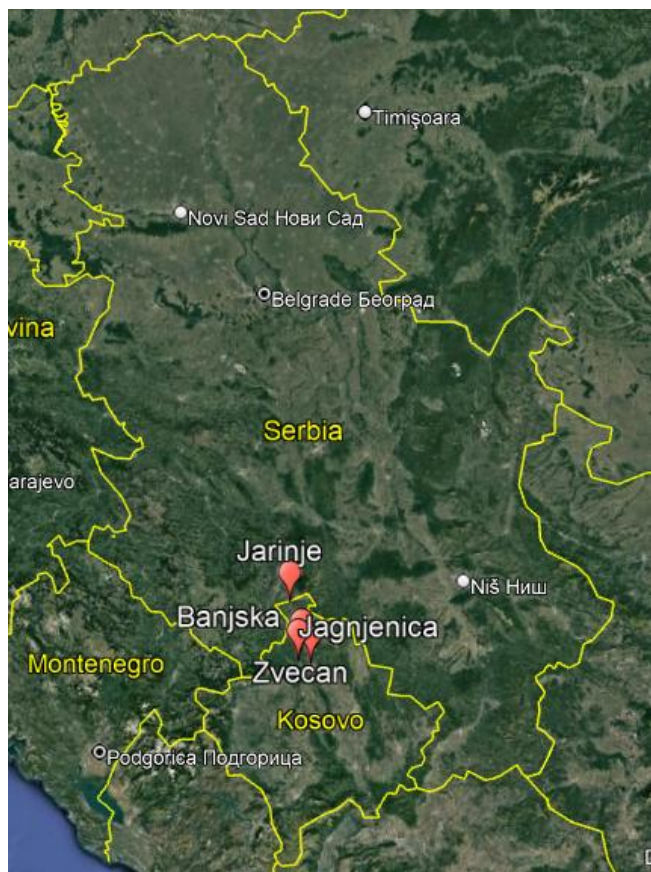


Figure 1. Positions of the locations where the lichen species are investigated by KLM format, Google maps.

Standard microscopic techniques were used to identify the taxa of the collected samples up to species level. Morphological features were evaluated under a digital microscope, resolution 640x480 to 1600x1200. Same digital microscope was used to make photos for registered species. The identification of the lichen species was completed using the appropriate keys (Dobson, 2011; Wirth, 1995).

The collected lichen samples were deposited and recorded with matching vouchers, Herbarium of the Institute of Botany and Botanical Garden "Jevremovac", University of Belgrade (BEOU), (international abbreviation for the University of Belgrade Herbarium), Belgrade and in the private collection.

RESULTS AND DISCUSSION

1. *Acarospora impressula* Th. Fr. (Fig. 2).

Specimen examined: Jarinje, on exposed, Southern side of siliceous rocks, in the immediate vicinity of the administrative crossing, 18. March 2018. Aleksić G. (BEOU 409), private collection.

Distribution: In Britain and Ireland recorded at well-lit siliceous rocks, especially granite and also metal-rich sites, scarpes, mainly near the coast in the West (Dobson, 2011: 57);

also reported from Italy (Nimis, 2016:30); Alps (Nimis, 2018: 15); Bulgaria (Denchev, 2022: 6).



Figure 2. *Acarospora impressula*.

2. *Acarospora nitrophila* H. Magn. (Fig. 3).

Specimen examined: Banjska, on the exposed, flat siliceous rock, in the vicinity of the medieval Banjska monastery, 2. October 2017; 5. February 2023, Aleksić G. (BEOU 638), private collection.

Distribution: Recorded former Yugoslavia as "very rare" for Macedonia, on siliceous (eruptive) rocks (Murati, 1992: 73); in Britain and Ireland present on siliceous rock, especially if metal-rich, frequently occurs on the string courses and chamfers of churches (Dobson, 2011: 58); reported from Italy (Nimis, 2016: 32); in Alps (Nimis, 2018: 15); in Bulgaria (Denchev, 2022: 6).



Figure 3. *Acarospora nitrophila*.

3. *Acarospora nodulosa* (Dufour) (Fig. 4).

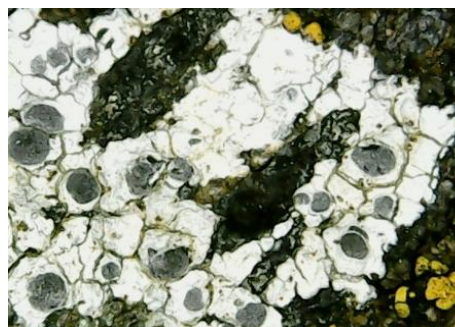


Figure 4. *Acarospora nodulosa*.

Specimen examined: Zvečan, on eruptive rocks, Northwest side, 3. March 2019; Jagnjenica, on the top of the rocky hill, 3. March 2019; Jarinje, on exposed, Southern side of siliceous rocks 15. April 2019, Aleksić G. (BEOU 260, 302, 303, 304/a, 365), private collection.

Distribution: Reported from Italy (Nimis, 2016:32); in Alps found in very open habitats (Nimis, 2018: 17).

4. *Acarospora schleicheri* (Ach.) A. (Fig. 5).

Specimen examined: Zvečan, prominent elevation, former volcano, on very dry siliceous rock, Southern exposure, 5. May 2018, Aleksić G. (BEOU 621).

Distribution: Recorded in former Yugoslavia as "very rare" for Macedonia, (Murati, 1992: 75); also known in Italy (Nimis, 2016:33); widespread in Eurasia and North America; in the Alps confined to Inner-Alpine dry valleys (Nimis, 2018: 18).



Figure 5. *Acarospora schleicheri*.

5. *Acarospora sinopica* (Wahlenb.) Korb, (Fig. 6).

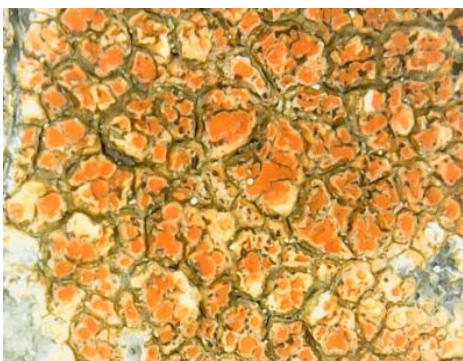


Figure 6. *Acarospora sinopica*.

Specimen examined: Jagnjenica, on the top of the rocky hill, 3. March 2019; 15. January 2023, Aleksić G. (BEOU 639), private collection.

Distribution: Known in Bulgaria (Murati, 1992: 74); fairly common in upland areas in Britain and Ireland, on iron-rich acid rock, often with *Tremolechia atrata*, *Rhizocarpon oederi* and *Lecanora epanora* (Dobson, 2011: 58); also, it has been reported from Italy (Nimis, 2016: 33); Alps as *Acarospora smaragdula* (Wahlenb.) A. Massal. var. *sinopica*

(Wahlenb.) A. Massal. (Nimis, 2018: 19); Bulgaria (Denchev, 2022: 6).

6. *Acarospora smaragdula* (Wahlenb.) A. Massal. (Fig. 7).

Specimen examined: Zvečan, on top of a former volcano, widespread on very exposed eruptive rock, 2. April 2019, 12. January 2023, Aleksić G. (BEOU 366, 367, 368/a), private collection.

Distribution: Previously known in former Yugoslavia as "rare" for the Croatia, Macedonia, Bosnia (Murati, 1992: 74); present in Bosnia and Herzegovina (Bilovitz & Mayrhofer, 2010: 3); found in metal-rich situations like a walls, under metal grids, fairly common on siliceous rocks in Britain and Ireland (Dobson, 2011: 58).



Figure 7. *Acarospora smaragdula*.

7. *Acarospora umbilicata* Bagl. (Fig. 8).

Specimen examined: Banjska, on the exposed flat siliceous rock, near the monastery Banjska, 26. October 2016; Zvečan, on exposed eruptive rock, 1. June 2018; Sendol, on the semi-shady part of the siliceous rock, 03. March 2019, Aleksić G. (BEOU 330, 369, 410).

Distribution: Reported for the Mediterranean region of the former Yugoslavia on exposed sites (Murati, 1992: 75); in Britain and Ireland mainly present on siliceous rocks and walls in seepage tracks from mortar and calcareous substrata (Dobson, 2011: 59); Italy (Nimis, 2016: 34).

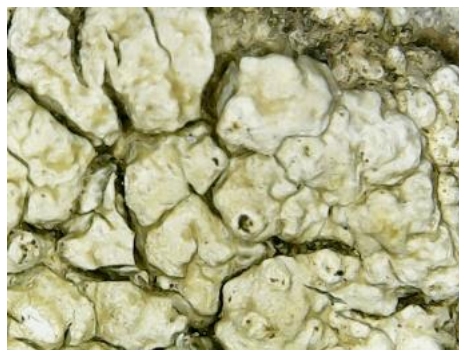


Figure 8. *Acarospora umbilicata*.

ACKNOWLEDGEMENTS

Author would like to thank to Dejan Živković, graduate engineer of electronics and telecommunications, for technical support.

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