

## Lichen Mapping in Yugoslavia, especially in Slovenia

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With 2 figures and 1 table

The state of the knowledge on the lichen flora of Slovenia as well as of other parts of Yugoslavia is rather bad. Since the death of FRAN KUŠAN, the famous Croatian lichenologist, who had compiled data on Yugoslavian lichen species with respect to both foreign sources and his own fieldwork, we have not had any better trained lichenologist. Therefore KUŠAN's work (KUŠAN 1953) remains the only reliable source on the lichen flora in Yugoslavia.

The lichen flora of Slovenia was mainly investigated by foreign lichenologists of whom GLOWACKI & ARNOLD (1874) and ZAHLBRUCKNER (1922–34) were the most important ones. Unfortunately these lichenologists visited only a few well known localities which are cited by KUŠAN again. The greater part of the country remains uninvestigated.

Air pollution problems which have arisen during the last twenty years led to an increased interest in lichens. Epiphytic lichens of some more polluted regions were mapped (BATIČ et al. 1979, BATIČ & MARTINČIČ 1982) and taxonomic work on lichens slowly started again. Interest for lichens increased in connection with growing knowledge on their sensitivity to air pollution. Between 1975 and 1979 the Pan-slovenian Youth Research Program mapped the whole area of Slovenia, considering the distribution of different epiphytic lichen growth forms (BATIČ et al. 1984). A simple lichen map was constructed. Interest for lichens as air quality indicators increased again in connection with forest decline studies. As we had once more not enough trained lichenologists, very simple methods of air quality bioindication on forest damage inventory plots were applied (BATIČ & KRALJ 1989). Three main thallus types of epiphytic lichens, i. e. crustose, foliose and fruticose were registered. The frequency, coverage and height of growth on the tree trunk of the dominant tree species were assessed for each growth form group. A lichen map of Slovenia was constructed from these data (Fig. 1, 2). It reflects the general state of air pollution in our republic. That kind of lichen inventory was performed twice in the years 1985 and 1987 on the 4 km x 4 km grid of forest damage inventory plots consisting of 1125 units. At the same time we are proceeding with lichen mapping on the 16 km x 16 km bioindication grid system used in forest decline research. The aim of this work is to obtain the basis of lichen distribution in our forests and to improve bioindication of air pollution with epiphytic lichens. First of all we are going to map some macrolichen species, later on the whole flora. We are still facing problems in the identifications of microlichens and very little work has been done on the epilithic flora.

In Yugoslavia there is a strong interest in the use of lichens as bioindicators but much less in taxonomic work. At present there is no full time lichenologist in the whole country. Therefore progress in lichen mapping will be very slow. Because of

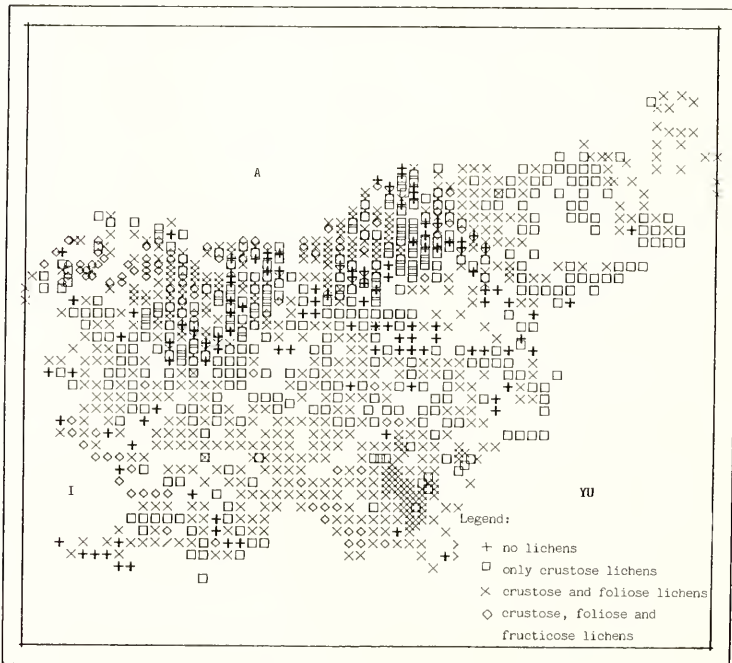
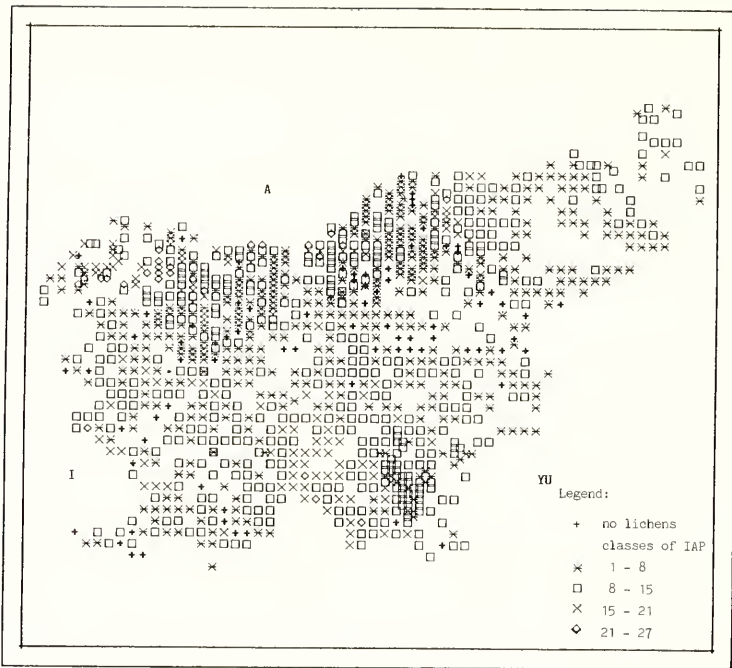


Fig. 1. (above) Lichen map of Slovenia based on IAP values (index of atmospheric purity), using data from the 1987 forest decline inventory.

Fig. 2. (below) Lichen map of Slovenia showing presence and distribution of lichens with different thallus types.

growing air pollution in our country some species may disappear before ever having been recorded in our flora. The installation of filter equipments on major sulphur dioxide emission sources is planned for 1993. Already now the epiphytic lichen vegetation of our country is quite endangered. We have noticed a major decline or even disappearance of pollution sensitive species, and even the more resistant ones clearly show symptoms of damage. As we have only a few early lichen records it is difficult to obtain a red data list. Table 1 therefore represents a preliminary list only.

Table 1. Preliminary RED DATA LIST of Lichens in Slovenia. – Nomenclature according to POELT (1969), POELT & VĚZDA (1977, 1981) and WIRTH (1980). Classification of endangered species according to TÜRK & WITTMANN (1986, p. 166) modified for Slovenia. – Symbols in front of species names indicate: 0 = extinct or missing; – 1 = threatened by extinction if pollution is not decreased immediately; – 2 = as 1, but naturally very rare species, or species confined to special habitats; – 3a = endangered, generally common but showing severe decline in some areas, mainly caused by air pollution; – 3b = as 3a, but less common, restricted to special habitats where other anthropogenous influences play a significant role; – r = very rare in Slovenia or not well known and confined to rare habitats or occurring incidentally; in some cases the actual occurrence in Slovenia is doubtful.

r, 0	<i>Alectoria ochroleuca</i>	r, 2	<i>Parmelia incurva</i>
3a	<i>Anaptychia ciliaris</i>	r, 2	<i>Parmelia laevigata</i>
r, 3b	<i>Bryoria nadvornikiana</i>	3b	<i>Parmelia quercina</i>
3b	<i>Bryoria subcana</i>	3a	<i>Parmelia tiliacea</i>
3b	<i>Cetraria sepincola</i>	3a	<i>Parmelia pastillifera</i>
3a	<i>Cetraria chlorophylla</i>	r, 1	<i>Parmelia stuppea</i>
3a	<i>Cetraria laureri</i>	r, 1	<i>Parmelia taylorensis</i>
3a	<i>Cetraria olivetorum</i>	r, 3b	<i>Peltigera aphthosa</i>
r, 3b	<i>Cladonia arbuscula</i>	r, 3b	<i>Peltigera leucophebia</i>
r, 3b	<i>Cladonia mitis</i>	r, 3b	<i>Peltigera collina</i>
3b	<i>Cladonia rangiferina</i>	r, 3b	<i>Peltigera horizontalis</i>
2	<i>Collema fasciculare</i>	3b	<i>Peltigera polydactyla</i>
3a	<i>Collema nigrescens</i>	r, 3b	<i>Pertusaria constricta</i>
2	<i>Collema occultatum</i>	3b	<i>Pertusaria hemisphaerica</i>
r, 1	<i>Evernia divaricata</i>	3a	<i>Pertusaria pertusa</i>
3a	<i>Evernia prunastri</i>	3a	<i>Phlyctis agelaea</i>
3b	<i>Icmadophila ericetorum</i>	3a	<i>Physcia aipolia</i>
3b	<i>Leptogium cyanescens</i>	3b	<i>Physcia biziana</i>
3a	<i>Leptogium saturninum</i>	3b	<i>Physcia hirsuta</i>
r, 1	<i>Lobaria amplissima</i>	3b	<i>Physcia labrata</i>
1	<i>Lobaria pulmonaria</i>	r, 3b	<i>Physcia luganensis</i>
r, 1	<i>Lobaria scrobiculata</i>	3a	<i>Physcia stellaris</i>
3a	<i>Menegazzia terebrata</i>	3b	<i>Physconia deterosa</i>
3a	<i>Mycoblastus sanguinarius</i>	3b	<i>Physconia enteroxantha</i>
3b	<i>Ochrolechia pallescens</i>	3a	<i>Physconia grisea</i>
3b	<i>Ochrolechia szatalaensis</i>	3a	<i>Physconia pulverulenta</i>
2	<i>Nephroma bellum</i>	3a	<i>Pyrenula laevigata</i>
r, 2	<i>Nephroma laevigatum</i>	3a	<i>Pyrenula nitida</i>
r, 2	<i>Nephroma resupinatum</i>	3b	<i>Pyrenula nitidella</i>
0	<i>Pannaria rubiginosa</i>	3a	<i>Ramalina farinacea</i>
3a	<i>Parmelia acetabulum</i>	3a	<i>Ramalina fastigiata</i>
r, 2	<i>Parmelia arnoldii</i>	r, 2	<i>Ramalina fraxinea</i>
3a	<i>Parmelia caperata</i>	2	<i>Ramalina roesleri</i>
r, 2	<i>Parmelia carporrhizans</i>	r, 1	<i>Ramalina thrausta</i>
r, 2	<i>Parmelia flaventior</i>	r, 2	<i>Sphaerophorus globosus</i>

0	<i>Sticta fuliginosa</i>	3b	<i>Usnea fulvovireagens</i>
3a	<i>Thelotrema lepadinum</i>	3b	<i>Usnea glabrescens</i>
r, 0	<i>Thamnolia vermicularis</i>	0	<i>Usnea hirta</i>
3b	<i>Usnea barbata s.ampl.</i>	0	<i>Usnea longissima</i>
3b	<i>Usnea ceratina</i>	3a	<i>Usnea subfloridana</i>
3b	<i>Usnea florida</i>		

## Literature

- BATIČ, F., SMERDU, N., MARTINČIČ, T. & VRHOVŠEK, D. (1979): Epifitska flora in onesnaženje zraka na področju mesta Ljubljane. Drugi kongres ekologa Jugoslavije; Zagreb.
- BATIČ, F. & MARTINČIČ, A. (1982): Vpliv fluoridov iz tovarne glinice in aluminija v Kidričevem na epifitsko floro lišajev. — Biol. Vest. 23: 1–12; Ljubljana.
- BATIČ, F., GOSAR, M., PETKOVŠEK, Z. & PETERLIN, M. (1984): Raziskovanje onesnaženosti zraka v Sloveniji II. — Prirodoslovno društvo Slovenije; Ljubljana.
- BATIČ, F. & KRALJ, T. (1989): Bioindikacija onesnaženosti zraka z epifitsko lišajsko vegetacijo pri inventurah propadanja gozdov. Zbornik gozdarstva in lesarstva; Ljubljana.
- GLOWACKI, J. & ARNOLD, F. (1870): Flechten aus Krain und Küstenland. — Verh. Zool.-Bot. Ges. Wien 20: 431–466; Wien.
- KUŠAN, F. (1953): Prodrumus flore lisaja Jugoslavije. Jugoslovenska akademija znanosti i umjetnosti. — 595 p.; Zagreb.
- POELT, J. (1969): Bestimmungsschlüssel europäischer Flechten. — 757 p.; Lehre (Cramer).
- POELT, J. & VÉZDA, A. (1977): Bestimmungsschlüssel europäischer Flechten. Ergänzungsheft 1. — 258 p.; Vaduz (Cramer).
- & — (1981): Bestimmungsschlüssel europäischer Flechten. Ergänzungsheft 2. — 390 p.; Vaduz (Cramer).
- TÜRK, R. & WITTMANN, H. (1986): Rote Liste gefährdeter Flechten (Lichenes) Österreichs. — In: NIKLFELD, H. (ed.): Rote Listen gefährdeter Pflanzen Österreichs. Grüne Reihe Bundesminist. Gesundh. Umweltschutz 5: 164–176; Wien.
- WIRTH, V. (1980): Flechtenflora. — 552 p.; Stuttgart (Ulmer).
- ZAHLBRÜCKNER, A. (1922–1934): Catalogus lichenum universalis, Bd. I–IX. — Leipzig (Bornträger).

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