ECOLOGICAL INDICATOR VALUES OF SOME LICHEN SPECIES NOTED IN POLAND

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ABSTRACT

The paper presents the ecological indicator values for 360 lichen species noted in Poland. For the given species estimated were the climatic indicators (light, temperature, moisture) and the edaphic ones (trophicity, habitat acidity). The estimate is based mainly on field studies and Polish lichenological literature. Presented are also the dynamics tendencies, i.e expansion or dieback of the analyzed species. According to papers by Polish authors, concerning various groups of plants, used were five degrees' scales of the analysed indices.

KEY WORDS: lichens, indicator values, Poland.

INTRODUCTION

From the beginning of scientific botanical studies it is generally known, that plants point at the habitat conditions in which they grow. That remark concerns also the fungi and other groups of living organisms. Astonishing is that before over half a century, under the influence of papers of the German geobotanicist H. Ellenberg and his disciples started were experiments of quantitative plant calibration on impact of various habitat factors. In 1965 (and succeeding years) elaborated were the so-called ecological indicator values for middle Europe plants (Ellenberg 1965). Since that time realized were many regional elaborations, mainly in country scale, among others also for Poland (Zarzycki et al. 2002). However, the lichens as a group have been elaborated by means of this method by V. Wirth not before the latest edition of Ellenberg's et al. (1992) monography. More recent observations and critical remarks concerning the use of ecological values for lichens are included, among others, in papers by Nimis et al. (2003, 2004). As opposed to plants the ecological lists of lichens are rarely published (both in local, as well as in country's scale). These lists allow better to understand the functioning of concentrating lichen ecosystems, as well as the scale of changes in the species composition of regional floras.

MATERIAL AND METHOD

The paper includes suggestions of ecological indicator values for 360 lichen species recorded in Poland (Table 1). The presented taxons are in most cases frequent or common and settle various types of natural forests and non-forests, both in lowland and in the mountains. For all the species evaluated were the climatic, light, temperature and moisture indicators, as well as the edaphic indicators: trophicity and habitat acidity. The indicator values have been elaborated on the basis of field studies and the accessible literature items describing more precise the habitat requirements or distribution of the particular taxons (e.g. Czarnota 2007; Ellenberg et. al. 1992; Fałtynowicz 2003; Nowak and Tobolewski 1975; Szczepańska 2008; Wirth 1995). Evatuated have been also the current dynamic tendencies observed in Poland (expansion or dieback of species), and for epiphytic lichens the tolerance of air contamination. We passed over the described by other authors response of lichens to heavy metals. The number of typical metalophytes in Poland is rather small. Furthermore, the views on metalophytic responses in lichens are considerably diverse (Ernst 2003). The critically endangered taxons, and those showing a drop in the sites has been determined on the basis of the "Red List of Extinct and endangered Lichens in Poland" (Ciesliński et al. 2003) The tax-

TABLE 1. Ecological indicator values of some lichen species noted in Poland.

Species	Climate value			Edaphic value		Resistance	Dynamic
	L	T	W	Tr	R	To	E
***Absconditella** lignicola* Vězda & Pišut	2	2	5	1	1	-	4
***Acarospora** cervina* A. Massal.	5	x	2	4	5	-	2
A. fuscata (Nyl.) Arnold	5	x	2	4	3	-	3
A. glaucocarpa (Ach.) Körb.	4	x	2	4	5	-	2
A. macrospora (Hepp) A. Massal. ex Bagl.	5	3	1	3	5	-	2
A. smaragdula (Wahlenb.) A. Massal.	4	x	3	4	4	-	3
***Acrocordia** gemmata* (Ach.) A. Massal.	4	4	3	4	4	2	2
***Alectoria** nigricans* (Ach.) Nyl.	5	1	4	1	1	-	2
A. ochroleuca (Hoffm.) A. Massal.	5	1	4	1	1	-	3
***Allantoparmelia** alpicola* (Th. Fr.) Essl.	5	1	4	1	1	-	2
***Allocetraria** madreporiformis* (Ach.) Kärnefelt & A. Thell	5	1	3	3	5	-	1
***Amandinea** punctata* (Hoffm.) Coppins & Scheid.	4	4	2	4	3	5	5
***Anaptychia** ciliaris* (L.) Körb. ex A. Massal.	4	4	2	5	4	1	1
***Arctoparmelia** incurva* (Pers.) Hale	5	2	3	1	2	-	3
***Arthonia** radiata* (Pers.) Ach.	3	4	3	3	3	3	3
A. spadicea Leight.	2	4	4	3	2	4	3
A. vinosa Leight.	3	3	3	3	3	2	2
***Arthrorhaphis** citrinella* (Ach.) Poelt	5	x	3	1	1	-	2
***Aspicilia** caesiocinerea* (Nyl. ex Malbr.) Arnold	5	3	3	4	3	-	3
A. calcarea (L.) Mudd	5	3	2	3	5	-	3
A. cinerea (L.) Körb.	5	3	3	3	3	-	3
A. contorta (Hoffm.)	5	3	3	3	3	-	3
A. laevata (Ach.) Arnold	2	3	5	2	2	-	3
A. moenium (Vain.) G. Thor & Timdal	5	4	2	3	5	-	3
A. radiosa (Hoffm.) Poelt & Leuckert	5	4	1	5	5	-	3
***Bacidia** arnoldiana* Körb.	3	4	3	3	3	4	4
B. inundata (Fr.) Körb.	2	3	5	3	4	-	3
B. rosella (Pers.) De Not.	4	4	2	4	4	2	1
B. rubella (Hoffm.)A. Massal.	4	4	3	4	4	2	2
B. subincompta (Nyl.) Arnold	3	4	4	3	3	2	2
***Baeomyces** rufus* (Huds.) Rebent.	3	x	3	2	2	-	3
***Biatora** amaurospoda* Anzi	4	2	3	1	1	3	3
B. efflorescens (Hedl.) Räsänen	3	3	3	3	3	2	2
***Bilimbia** sabuletorum* (Schreb.) Arnold	3	3	3	4	5	-	3
***Brodoa** atrofusca* (Schaer.) Goward	5	1	4	1	2	-	2
B. intestiniformis (Vill.) Goward	5	1	4	1	2	-	2
***Bryoria** bicolor* (Ehrh.) Brodo & D. Hawksw.	4	1-2	4	2	2	1	1
B. fuscescens (Gyeln.) Brodo & D. Hawksw.	4	x	3	2	2	1	2
***Buellia** aethalea* (Ach.) Th. Fr.	5	x	1	3	3	-	3
B. disciformis (Fr.) Mudd	3	3	3	3	3	2	2
B. griseovirens (Turner & Borrer ex Srn.) Almb.	3	4	3	2	2	4	4
***Calicium** glaucellum* Ach.	2	3	3	2	2	2	2
C. salicinum Pers.	2	3	2	2	3	2	2
C. viride Pers.	2	3	2	2	2	2	2
***Caloplaca** cerina* (Hedw.) Th. Fr.	4	3	3	4	4	2	2
C. cirrochroa (Ach.) Th. Fr.	5	1-3	2	5	5	-	2
C. citrina (Hoffm.) Th. Fr.	4	4	1	5	5	-	5
C. decipens (Arnold) Blomb. & Forssell	5	4	1	5	5	-	4
C. holocarpa (Hoffm.) A.E. Wade	5	4	1	5	5	-	3
C. saxicola (Hoffm.) Nordin	5	x	1	5	5	-	4
C. teicholyta (Ach.) J.Steiner	5	4	1	5	5	-	4
***Candelaria** concolor* (Dicks.) Stein	4	4	2	4	4	3	3

TABLE 1. Cont.

Species	Climate value			Edaphic value		Resistance	Dynamic
	L	T	W	Tr	R	To	E
Candelariella *aurella* (Hoffm.) Zahlbr.	5	x	1	5	5	-	3
C. reflexa (Nyl.) Lettau	4	4	2	4	4	3	3
C. vitellina (Hoffm.) Müll. Arg.	5	x	2	3	3	-	3
C. xanthostigma (Pers. ex Ach.) Lettau	4	4	2	4	4	3	3
Catillaria *nigroclavata* (Nyl.) Schuler	4	4	2	4	4	3	3
Catolechia *wahlenbergii* (Flot. ex Ach.) Körb.	3	1	4	1	1	-	1
Cetraria *aculeata* (Schreb.) Fr.	4	x	1	1	2	-	3
C. ericetorum Opiz	4	3	2	1	2	-	2
C. islandica (L.) Ach.	4	x	2	1	2	-	2
C. sepincola (Ehrh.) Ach.	4	2	3	1	1	1	1
Cetrelia *olivetorum* (Nyl.) W.L. Culb. & C.F. Culb. s. lat.	3	3	3	3	3	1	1
Chaenotheca *brachypoda* (Ach.) Tibell	2	3	3	3	3	2	1
C. brunneola (Ach.) Müll. Arg.	2	3	3	3	2	2	1
C. chrysocephala (Turner ex Ach.) Th. Fr.	2	3	3	3	3	3	3
C. ferruginea (Turner ex Sm.) Mig.	3	x	2	2	2	3	3
C. furfuracea (L.) Tibell	2	4	3	2	2	2	2
C. phaeocephala (Turner) Th. Fr.	3	3	3	3	3	2	1
C. trichialis (Ach.) Th. Fr.	2	4	2	3	2	2	2
C. xyloxena Nádv.	2	3	2	2	2	2	2
Chrysothrix *candelaris* (L.) J.R. Laundon	3	4	2	3	2	2	1
C. chlorina (Ach.) J.R. Laundon	2	3	4	1	2	-	3
Cladonia *arbuscula* (Wallr.) Flot.	4	x	2	1	2	-	3
C. bellidiflora (Ach.) Schaer.	5	1	4	1	1	-	2
C. caespiticia (Pers.) Flörke	4	4	2	2	2	-	3
C. cenotea (Ach.) Schaer.	4	x	2	1	1	-	3
C. chlorophaea (Flörke ex Sommerf.) Spreng.	4	x	3	2	2	-	4
C. coccifera (L.) Willd.	5	2	4	3	2	-	3
C. coniocraea (Flörke) Spreng.	3	x	3	2	2	-	4
C. cornuta (L.) Hoffm.	3	4	2	2	2	-	3
C. deformis (L.) Hoffm.	4	x	2	1	2	-	3
C. digitata (L.) Hoffm.	3	x	3	2	1	-	4
C. fimbriata (L.) Fr.	4	x	2	1	2	-	3
C. foliacea (Huds.) Willd.	5	4	1	2	3	-	3
C. furcata (Huds.) Schrad.	4	x	2	2	2	-	3
C. gracilis (L.) Willd.	4	x	2	1	2	-	3
C. maci lenta Hoffm.	4	x	2	1	1	-	3
C. ochrochlora Flörke	4	x	3	2	2	-	4
C. phyllophora Hoffm.	3	4	2	1	2	-	3
C. pocillum (Ach.) Grognot	5	4	2	4	5	-	3
C. polydactyla (Flörke) Spreng.	3	x	3	1	1	-	3
C. portentosa (Dufour) Coem.	3	4	2	1	2	-	3
C. pyxidata (L.) Hoffm.	4	x	2	2	2	-	4
C. rangiferina (L.) F.H. Wigg.	4	x	2	1	2	-	2
C. stellaris (Opiz) Pouzar & Vèzda	4	2	3	1	1	-	1
C. subulata (L.) F.H. Wigg.	4	4	2	1	2	-	3
C. sulphurina (Michx.) Fr.	5	1	3	1	1	-	2
C. uncialis (L.) F.H. Wigg.	4	x	2	2	1	-	3
Clauzadea *monticola* (Ach.) Hafellner & Bellem.	4	4	2	3	5	-	3
Collema *auriforme* (With.) Coppins & J.R. Laundon	2	4	4	4	5	-	2
C. crispum (Huds.) Weber ex F.H. Wigg.	2	4	4	3	5	-	3
C. cristatum (L.) Weber ex F.H. Wigg.	5	4	3	3	5	-	1
C. flaccidum (Ach.) Ach.	2	3	5	4	3	1	1

TABLE 1. Cont.

Species	Climate value			Edaphic value		Resistance	Dynamic
	L	T	W	Tr	R	To	E
C. limosum (Ach.) Ach.	5	4	3	3	5	-	3
C. tenax (Sw.) Ach.	4	4	4	3	5	-	3
***Cornicularia** normoerica* (Gunn.) Du Rietz	5	1	4	1	2	-	2
***Cyphelium** tigillare* (Ach.) Ach.	5	2	3	1	1	-	1
***Cystocoleus** ebeneus* (Dillwyn) Thwaites	1	3	5	1	1	-	2
***Dermatocarpon** luridum* (With:) J.R. Laundon	4	3	5	2	3	-	1
D. miniatum (L.) W. Mann	4	3	4	3	4	-	2
***Dibaeis** baeomyces* (L. f.) Rambold & Hertel	5	x	1	1	1	-	2
***Dimelaena** oreina* (Ach.) Norm.	5	1	2	4	3	-	1
***Dimerella** pineti* (Ach.) Vězda	1	x	5	2	2	4	4
***Diploschistes** muscorum* (Scop.) R. Sant.	5	x	2	2	4	-	3
D. scruposus (Schreb.) Norman	3	x	3	3	2	-	3
***Endocarpon** pusillum* Hedw.	5	x	1	2	5	-	3
***Evernia** divaricata* (L.) Ach.	3	2	4	1	2	1	1
E. mesomorpha Nyl.	3	2	3	2	2	1	1
E. prunastri (L.) Ach.	4	x	3	4	3	2	2
***Fellhanera** subtilis* (Vèzda) Dieder. & Sérus	3	2-3	4	2	2	3	3
***Flavocetraria** cucullata* (Bellardi) Karnefelt & A. Thell	5	1	4	1	1	-	2
F. nivalis (L.) Karnefelt & Thell	5	1	4	1	1	-	1
***Flavoparmelia** caperata* (L.) Hale	3	4	3	3	3	2	1
***Flavopunctelia** flaventior* (Stirt.) Hale	4	3	2	4	3	1	1
***Fulgensia** fulgens* (Sw.) Elenkin	5	5	1	1	5	-	1
***Fuscidea** austera* (Nyl.) P. James	5	2	3	1	1	-	3
F. kochiana (Hepp) V. Wirth & Vězda	5	1	4	1	1	-	3
F. pusilla Tönsberg	3	3	3	3	3	3	3
***Graphis** scripta* (L.) Ach.	3	4	3	3	3	3	2
***Gyalecta** jenensis* (Batseh) Zahlbr.	2	3	4	3	5	-	2
***Hypocenomyce** caradocensis* (Leight. ex Nyl.) P. James & Gotth. Schneid.	4	4	3	1	1	4	4
H. scalaris (Ach. ex Lilj.) M. Choisy	4	x	2	1	1	5	5
***Hypogymnia** farinacea* Zopf	3	2	4	1	1	2	2
H. physodes (L.) Nyl.	4	x	3	2	2	5	4
H. tubulosa (Schaer.) Hav.	4	4	3	3	3	3	3
H. vittata (Ach.) Parrique	3	2	4	1	1	1	1
***Hypotrachyna** revoluta* (Flörke) Hale	3	4	4	3	3	1	1
***Icmadophila** ericetorum* (L.) Zahlbr.	3	2	4	1	1	-	2
***Imshaugia** aleurites* (Ach.) S.L.F.Meyer	4	3	3	1	1	3	3
***Lasallia** pustulata* (L.) Merat	5	4	1	4	3	-	1
***Lecanactis** abietina* (Ach.) Körb.	2	2	4	1	1	2	1
***Lecania** cyrtella* (Ach.) Th. Fr.	4	x	2	4	4	3	3
***Lecanora** albescens* (Hoffm.) Branth & Rostr.	5	4	1	5	5	-	5
L. argentata (Ach.) Malme	4	4	3	3	3	3	3
L. carpinea (L.) Vain.	4	4	3	3	3	3	3
L. cenisia Ach.	5	2	4	1	1	-	3
L. chlarotera Nyl.	4	4	3	3	3	3	3
L. conizaeoides Nyl. ex Cromb.	3	x	2	2	1	5	5
L. crenulata (Dicks.) Hook.	5	4	2	4	5	-	3
L. dis persa (Pers.) Sommerf.	5	4	1	5	5	-	5
L. expallens Ach.	4	4	3	3	3	5	5
L. hagenii (Ach.) Ach.	4	x	2	4	4	4	3
L. intricata (Ach.) Ach.	5	x	3	1	2	-	3
L. intumescens (Rebent.) Rabenh.	4	4	3	3	3	2	2
L. muralis (Schreb.) Rabenh.	5	4	1	5	5	-	5

TABLE 1. Cont.

Species	Climate value			Edaphic value		Resistance	Dynamic
	L	T	W	Tr	R	To	E
L. orosthea (Ach.) Ach.	3	3	3	1	2	-	3
L. polytropa (Hoffm.) Rabenh.	5	x	3	1	2	-	3
L. pulicaris (Pers.) Ach.	3	x	3	3	2	4	4
L. rupicola (L.) Zahlbr.	5	4	2	3	3	-	3
L. saligna (Schrad.) Zahlbr	4	x	2	3	2	3	3
L. soralifera (Suza) Räsänen	5	3	3	4	2	-	2
L. swartzii (Ach.) Ach.	4	2	2	1	1	-	3
L. symmicta (Ach.) Ach.	4	x	3	2	2	3	3
L. varia (Hoffm.) Ach.	4	4	2	3	3	3	3
***Lecidea** confluens* (Weber) Ach.	5	1	4	1	3	-	3
L. fuscoatra (L.) Ach.	5	4	2	3	3	-	3
L. lactea Flörke ex Schaerer	5	2	3	2	2	-	3
L. lapicida (Ach.) Ach.	5	2	3	2	2	-	3
L. litophila (Ach.) Ach.	4	x	3	1	2	-	3
L. plana (J. Lahm) Nyl.	4	x	3	1	2	-	3
***Lecidella** elaeochroma* (Ach.) M. Choisy	3	4	3	3	3	3	3
L. stigmatea (Ach.) Hertel & Leuckert	5	x	2	4	5	-	4
***Lecidoma** demissum* (Rutstr.) Gotth. Schneid. & Hertel	5	1	4	1	2	-	1
***Lepraria** caesioalba* (B. de Lesd.) J.R. Laundon	5	2	2	2	2	-	4
L. elobata Tönsberg	3	x	3	2	2	5	4
L. incana (L.) Ach.	3	4	3	2	2	5	5
L. jackii Tönsberg	3	3	3	2	2	5	4
L. lobificans Nyl.	2	x	4	2	4	5	4
L. membranacea (Dicks.) Vain.	2	3	3	2	2	5	4
L. neglecta (Nyl.) Lettau	4	x	2	2	2	-	4
L. rigidula (B. de Lesd.) Tönsberg	4	4	2	3	3	5	4
***Leptogium** gelatinosum* (With.) J.R. Laundon	3	x	4	3	5	-	2
L. lichenoides (L.) Zahlbr.	3	x	4	3	4	-	3
L. saturninum (Dicks.) Nyl.	4	3	3	3	4	1	1
***Lichenomphalia** hudsoniana* (H.S. Jenn.) Redhead, Lutzoni, Moncalvo & Vilgalys	4	1	4	1	2	-	2
L. umbellifera (L.: Fr.) Redhead, Lutzoni, Moncalvo & Vilgalys	3	2	4	2	2	-	3
***Lobaria** pulmonaria* (L.) Hoffm.	3	3	4	3	3	1	1
***Loxospora** elatina* (Ach.) A. Massal.	3	2-3	4	1	1	2	1
***Melanelia** hepatizon* (Ach.) A. Thell	5	1	4	1	1	-	3
M. stygia (L.) Essl.	5	1	4	1	1	-	3
***Melanelixia** fuliginosa* (Fr. ex Duby) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch	3	4	3	3	3	3	4
M. glabra (Schaer.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch	4	3	2	5	4	1	1
M. subargentifera (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch.	4	4	2	5	4	2	2
***Melanohalea** exasperatula* (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch	4	4	2	4	4	3	3
***Menegazzia** terebrata* (Hoffm.) A. Massal.	3	4	4	3	3	1	1
***Micarea** adnata* Coppins	2	2	4	2	2	2	2
M. botryoides (Nyl.) Coppins	2	3	3	1	1	4	4
M. crassipes (Th. Fr.) Coppins	5	1	4	1	1	-	2
M. denigrata (Fr.) Hedl.	4	x	2	3	2	-	4
M. lignaria (Ach.) Hedl.	4	1-2	5	1	1	-	3
M. lithinella (Nyl.) Redl.	2	3	4	1	1	-	3
M. lutulata (Nyl.) Coppins	2	3	4	3	2	-	3
M. micrococca (Korb.) Gams ex Coppins	2	4	4	2	1	4	3
M. peliocarpa (Anzi) Coppins & R. Sant.	2	3	4	2	1	-	4
M. prasina Fr.	2	x	4	1	1	5	5
M. sylvicola (Flot.) Vězda & V. Wirth	2	3	3	3	2	-	3
***Mycobilimbia** tetramera* (De Not.) Vitik., Ahti, Kuusinen, Lommi & T. Ulvinen	3	4	3	3	3	-	3

TABLE 1. Cont.

Species	Climate value			Edaphic value		Resistance	Dynamic
	L	T	W	Tr	R	To	E
Mycoblastus *fucatus* (Stirt.) Zahlbr.	3	x	3	2	1	5	5
M. sanguinarius (L.) Norman	3	2	3	1	1	2	2
Nephroma *parile* (Ach.) Ach.	3	3	4	3	3	1	1
Normandina *pulchella* (Borrer) Nyl.	3	3	4	4	3	2	1
Ochrolechia *androgyna* (Hoffm.) Arnold	3	3	3	3	3	2	2
Opegrapha *gyrocarpa* Flotow	1	2	4	2	3	-	2
O. rufescens Pers.	2	4	3	3	3	2	2
O. varia Pers.	3	4	2	3	3	2	2
O. viridis (Ach.) Nyl.	2	4	4	3	3	2	2
O. vulgata (Ach.) Ach.	3	4	3	3	3	2	2
O. zonata Körb.	1	3	4	2	3	-	2
Ophioparma *ventosa* (L.) Norman	5	1	4	1	2	-	2
Pachyphiale *fagicola* (Hepp) Zwackh	4	4	2	4	3	3	2
Parmelia *omphalodes* (L.) Ach.	4	2	3	2	2	-	2
P. saxatilis (L.) Ach.	4	x	3	2	2	3	3
P. submontana Nadv. ex Hale	3	3	4	3	3	2	2
P. sulcata Taylor	4	x	3	3	3	4	3
Parmelina *carporrhizans* (Taylor) Poelt & Vězda	4	4	2	4	4	2	1
P. tiliacea (Hoffm.) Hale	4	4	2	4	4	2	2
Parmeliopsis *ambigua* (Wulfen) Nyl.	4	x	3	2	1	4	4
P. hyperopta (Ach.) Arnold	4	2	3	1	1	2	2
Peltigera *aphthosa* (L.) Willd.	3	1	4	1	2	-	1
P. canina (L.) Willd.	3	4	3	3	4	-	2
P. degenii Gyeln.	3	3	3	3	4	-	2
P. didactyla (With.) J.R. Laundon	5	4	2	4	4	-	4
P. leucophlebia (Nyl.) Gyeln.	3	1	4	3	3	-	1
P. malacea (Ach.) Funck	4	3	4	1	2	-	2
P. praetextata (Flörke ex Sommerf.) Zopf	3	3	4	3	3	-	2
P. rufescens (Weiss) Humb.	5	4	2	3	5	-	4
P. venosa (L.) Hoffm.	3	1	4	2	3	-	1
Pertusaria *albescens* (Huds.) M. Choisy & Werner	4	4	2	4	4	3	3
P. amara (Ach.) Nyl.	3	4	3	3	3	3	3
P. coccodes (Ach.) Nyl.	4	4	3	4	3	2	2
P. corallina (L.) Arnold	5	1-2	3	2	2	-	3
P. hemisphaerica (FIörke) Erichsen	3	4	3	3	3	3	2
P. hymenea (Ach.) Schaer.	4	4	3	3	3	2	1
P. lactea (L.) Arnold	5	1-2	3	2	2	-	3
P. leioplaca DC.	3	4	3	3	3	3	2
P. pertusa (Weigel) Tuck.	3	4	3	3	3	2	2
P. pupillaris (Nyl.) Th. Fr.	3	4	3	3	3	3	2
Phaeophyscia *nigricans* (Flörke) Moberg	5	x	1	5	5	-	4
P. orbicularis (Neck.) Moberg	4	x	2	4	4	4	4
Phlyctis *argena* (Spreng.) Flot.	4	4	2	3	3	4	3
Physcia *adscendens* H. Olivier	4	x	2	4	4	4	4
P. caesia (Hoffm.) Fürnr.	5	x	1	5	5	-	4
P. dubia (Hoffm.) Lettau	5	x	1	5	4	-	3
P. stellaris (L.) Nyl.	4	4	3	4	4	2	2
P. tenella (Scop.) DC.	4	x	2	4	4	4	5
Physconia *distorta* (With.) J.R. Laundon	4	4	2	5	4	1	1
P. enteroxantha (Nyl.) Poelt	4	4	2	5	4	2	3
P. grisea (Lam.) Poelt	4	4	2	4	4	4	4
P. muscigena (Ach.) Poelt	5	2	2	4	5	-	2

TABLE 1. Cont.

Species	Climate value			Edaphic value		Resistance	Dynamic
	L	T	W	Tr	R	To	E
P. perisidiosa (Erichsen) Moberg	4	4	2	5	4	2	1
Placidium *squamulosum* (Ach.) Breuss	5	4	1	4	5	-	2
Placynthiella *dasaea* (Stirt.) Tønsberg	3	x	x	1	1	-	5
P. icmalea (Ach.) Coppins & P. James	4	x	x	1	1	-	5
P. oligotropha (J.R. Laundon) Coppins & P. James	5	x	1	1	1	-	4
P. uliginosa (Schrad.) Coppins & P. James	5	x	1	1	1	-	4
Placynthium *nigrum* (Huds.) Gray	5	x	2	3	5	-	2
Platismatia *glaca* (L.) W.L. Culb. & C.F. Culb.	4	x	3	2	2	3	3
Pleopsidium *chlorophanum* (Wahlenb.) Zopf	4	1-2	2	1	1	-	1
Pleurosticta *acetabulum* (Neck.) Elix & Lumbsch	4	4	2	5	4	1	1
Polysporina *simplex* (Davies) Vězda	5	4	2	3	3	-	3
Porina *aenea* (Wallr.) Zahlbr.	2	4	4	3	3	4	4
P. chlorotica (Ach.) Mull. Arg.	2	3	5	2	2	-	3
P. leptalea (Durieu & Mont.) A.L. Srn.	2	3	4	3	3	3	2
Porpidia *crustulata* (Ach.) Hertel & Knoph	4	x	2	1	2	-	3
P. macrocarpa (DC.) Hertel & A.J. Schwab	4	2-3	3	1	2	-	3
P. tuberculosa (Srn.) Hertel & Knoph	x	x	3	1	2	-	3
Protoblastenia *rupestris* (Scop.) J. Steiner	4	x	3	4	5	-	3
Protopannaria *pezizoides* (Weber) P. M. Jørg. & S. Ekman	2	2	5	2	2	-	1
Protoparmelia *badia* (Hoffm.) Hafellner	5	1-2	3	2	2	-	2
Pseudephebe *pubescens* (L.) M. Choisy	5	1	4	1	1	-	1
Pseudevernia *furfuracea* (L.) Zopf	4	x	3	2	1	3	3
Psilolechia *lucida* (Ach.) M. Choisy	1	3	2	2	2	-	3
Psora *decipiens* (Hedw.) Hoffm.	5	x	1	2	5	-	1
P. testacea Hoffm.	5	x	1	2	5	-	1
Punctelia *jeckeri* (Roum.) Kalb	4	4	2	4	4	3	2
P. subrudecta (Nyl.) Krog	4	4	2	4	4	3	2
Pycnothelia *papillaria* Dufour	5	x	1	1	1	-	1
Pyrenula *nitida* (Weigel) Ach.	3	4	3	3	3	2	2
P. nitidella (Schaer.) Müll. Arg.	3	4	3	3	3	2	1
Ramalina *capitata* (Ach.) Nyl.	5	x	3	4	3	-	1
R. carpatica Körb.	5	1	4	1	1	-	2
R. farinacea (L.) Ach.	3-4	4	2	4	4	2	2
R. fastigiata (Pers.) Ach.	4	4	2	4	4	2	2
R. fraxinea (L.) Ach.	4	4	2	4	4	2	2
R. pollinaria (Westr.) Ach.	4	4	2	4	4	2	2
Rhizocarpon *alpicola* (Anzi) Rabenh.	5	1	4	1	2	-	2
R. distinctum Th. Fr.	5	4	2	3	3	-	3
R. geographicum (L.) DC.	5	x	3	2	1	-	3
R. hochstetteri (Körb.) Vain.	4	1	4	1	2	-	2
R. lecanorinum Anders	5	x	2	2	2	-	3
R. polycarpum (Hepp) Th. Fr.	4	x	3	2	3	-	3
Rhizoplaca *chrysoleuca* (Sm.) Zopf	5	1	4	4	3	-	1
Rinodina *pyrina* (Ach.) Arnold	4	x	3	4	4	3	3
Ropalospora *viridis* (Tönsberg) Tönsberg	3	4	4	3	2	4	4
Sarcogyne *privigna* (Ach.) A. Massal.	4	3	2	4	4	-	2
S. reguralis Körb.	5	4	1	3	5	-	4
Schaereria *fuscocinerea* (Nyl.) Clauzade & Cl. Roux	5	1-2	3	1	2	-	3
Scoliciosporum *chlorococcum* (Graewe ex Stenh.) Vězda	3	x	3	2	1	5	5
S. umbrinum (Ach.) Arnold	4	x	3	3	3	-	4
Solorina *crocea* (L.) Ach.	5	1	4	1	1	-	1
S. saccata (L.) Ach.	3	x	5	5	5	-	2

TABLE 1. Cont.

Species	Climate value			Edaphic value		Resistance	Dynamic
	L	T	W	Tr	R	To	E
S. spongiosa (Ach.) Anzi	4	2	4	4	5	-	1
***Sphaerophorus** fragilis* (L.) Pers.	5	1	4	2	2	-	1
***Staurothele** frustulenta* Vain.	5	4	1	5	4	-	3
***Steinia** geophana* (Nyl.) Stein	5	4	3	3	3	-	3
***Stereocaulon** dactylophyllum* Flörke	5	1-2	3	2	2	-	1
S. nanodes Tuck.	5	3	2	3	2	-	1
S. vesuvianum Pers.	5	1-2	3	2	3	-	2
***Strangospora** moriformis* (Ach.) Stein	4	4	2	3	3	3	3
S. pinicola (A. Massal.) Körb.	4	4	2	3	3	3	3
***Tephromela** atra* (Huds.) Hafellner	5	x	3	3	3	-	2
***Thamnolia** vermicularis* (Sw.) Schaerer	5	1	4	1	1	-	3
***Thelocarpon** laureri* (Flot.) Nyl.	4	x	3	4	4	-	3
***Thelomma** ocellatum* (Körber) Tibell	5	4	3	3	3	-	3
***Thelotrema** lepadinum* (Ach.) Ach.	3	2-3	3	3	3	2	2
***Thrombium** epigaeum* (Pers.) Wallr.	4	3	2	3	4	-	3
***Toninia** candida* (Weber) Th. Fr.	5	x	1	2	5	-	1
T. sedifolia (Scop.) Timdal	5	x	1	2	5	-	2
***Trapelia** coarctata* (Turner ex Sm.) M. Choisy	3	4	3	2	2	-	3
T. glebulosa (Srn.) J.R. Laundon	3	4	3	2	2	-	3
T. obtegens (Th. Fr.) Hertel	4	4	2	2	3	-	3
T. placodioides Coppins & P. James	3	4	3	2	3	-	3
***Trapeliopsis** flexuosa* (Fr.) Coppins & P. James	4	x	x	1	1	-	4
T. gelatinosa (Flörke) Coppins & P. James	2	3	4	1	1	-	3
T. granulosa (Hoffm.) Lumbsch	5	x	2	1	1	-	4
T. pseudogranulosa Coppin s & P. James	3	4	3	1	1	-	3
***Tremolecia** atrata* (Ach.) Hertel	5	1-2	3	2	1	-	3
***Tuckermanopsis** chlorophylla* (Willd.) Hale	4	x	3	2	2	2	2
***Umbilicaria** crustulosa* (Ach.) Frey	5	1	4	2	2	-	2
U. cylindrica (L.) Delise ex Duby	5	1-2	3	2	2	-	3
U. deusta (L.) Baumg.	5	x	3	3	3	-	3
U. hirsuta (Sw. ex Westr.) Hoffm.	5	2-3	2	3	3	-	3
U. hyperborea (Ach.) Hoffm.	5	1-2	3	2	2	-	2
U. polyphylla (L.) Baumg.	5	x	3	3	2	-	3
***Usnea** filipendula* Stirt.	3	3-4	4	2	2	1	2
U. hirta (L.) Weber ex F.H. Wigg.	4	4	4	2	2	1	2
U. subfloridana Stirt.	3	3-4	3	3	3	1	2
***Verrucaria** muralis* Ach.	5	x	2	4	5	-	3
V. nigrescens Pers.	5	x	2	4	5	-	4
***Vulpicida** pinastri* (Scop.) J.-E. Mattsson & M.J. Lai	4	x	3	1	1	2	2
V. tubulosus (Schaer.) J.-E. Mattsson & M.J. Lai	5	1	3	3	5	-	1
***Xanthoparmelia** conspersa* (Ehrh. ex Ach.) Hale	5	4	2	4	3	-	3
X. loxodes (Nyl.) O. Blanco *et al.*	5	4	2	4	3	-	3
X. stenophylla (Ach.) Ahti & D. Hawksw.	5	4	2	4	3	-	3
***Xanthoria** candelaria* (L.) Th. Fr.	4	4	2	4	4	3	3
X. elegans (Link) Th. Fr.	5	3	1	5	5	-	3
X. fallax (Hepp) Arnold	4	4	2	4	4	3	2
X. parietina (L.) Th. Fr.	4	4	2	4	4	4	3
X. polycarpa (Hoffm.) Th. Fr. ex Rieber	4	4	2	4	4	4	3

onomy of lichens has been accepted after Smith et al. (2009), and for certain taxons after Diederich et al. (2010) and Fałtynowicz (2003).

The indicators describe the site requirements in every of the species, the most typical conditions in which the species is most frequent found and develops best. All the

presented indicators have five-degree scales, and in the authors' intention they ought to refer to the paper of Zarzycki et al. (2002), and facilitate the possible statistical breakdowns and conversions. The scales with more than five degrees are, in our opinion, at the present stage of knowledge of lichen ecology are difficult for evaluation. The indicators do not reflect the whole range of site conditions, in which the given taxon can be met, and can in great extent be recognized as subjective perceptions of the authors, based on their individual experience acquired in field studies. However, one should remember that the presented indicators are only a certain proposal and an encouragement and invitation for a broader scientific discussion.

EXPLANATIONS OF COLUMN HEADINGS AND SYMBOLS

Climate value

L – light value

1 – deep shade
2 – moderate shade
3 – half-shade
4 – moderate light
5 – full light

T – temperature value

1 – coldest regions in the country, mainly alpinie and subnival zones
2 – moderately cold areas, mainly subalpine and upper mountains zones
3 – moderately cool areas, lower mountains zone
4 – moderately warm areas, most of the lowland and colline regions
5 – warmest regions in the country

W – habitat moisture value

1 – habitats very dry
2 – habitats dry
3 – habitats moderately moist
4 – habitats very moist
5 – habitats wet and water

Edaphic value

Tr – basis trophy value

1 – extremely poor
2 – poor
3 – moderately rich
4 – rich
5 – very rich

R – basis acidity value

1 – highly acidic soils, pH<4
2 – acidic soils, 4≤pH<5
3 – moderately acidic, 5≤pH<6
4 – subneutral to neutral, 6≤pH<7
5 – alkaline, pH>7

Resistance

To – value of resistance to air pollution

1 – very low
2 – low
3 – moderately
4 – high
5 – very high

Dynamic

E – dynamic tendencies in the last decade

1 – marked decrease in the number of localities, endangered species
2 – decrease in the number of localities
3 – no marked change in the number of localities observable, disappearance and appearance of new localities
4 – increase in the number of localities
5 – considerable increase and occupation of new localities, strongly expanding species

– – not investigated
x – very varied value

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