

Testing the LIFE MODERn (NEC) lichen protocols: results of a replicability study in Romanian long-term forest monitoring sites

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INTRODUCTION

The Replicability Strategy of the recently concluded LIFE MODERn (NEC) was designed to extend the project's impact to other EU Member States. In 2025, after the testing phase in Italy, a replicability study was conducted in collaboration with the Romanian National Institute for Research and Development in Forestry 'Marin Dracea' (INCDS).

AIM

To test the applicability to the Romanian forest sites of the lichen monitoring methods developed in the LIFE MODERn(NEC) project to respond to the NEC Directive.



MATERIALS AND METHODS

The study considered 6 Romanian long-term monitoring sites from the ICP Forests (4 Level II plots) and RO-LTER (2 plots). In May 2025, we evaluated three methods from the Italian NEC Directive Network:

- Diversity and biomass of ground fallen epiphytic fruticose lichens
- Epiphytic lichen diversity and its functional traits on lower trunks (LDV method)
- Viability of the indicator species *Lobaria pulmonaria*

2 Oak Forests

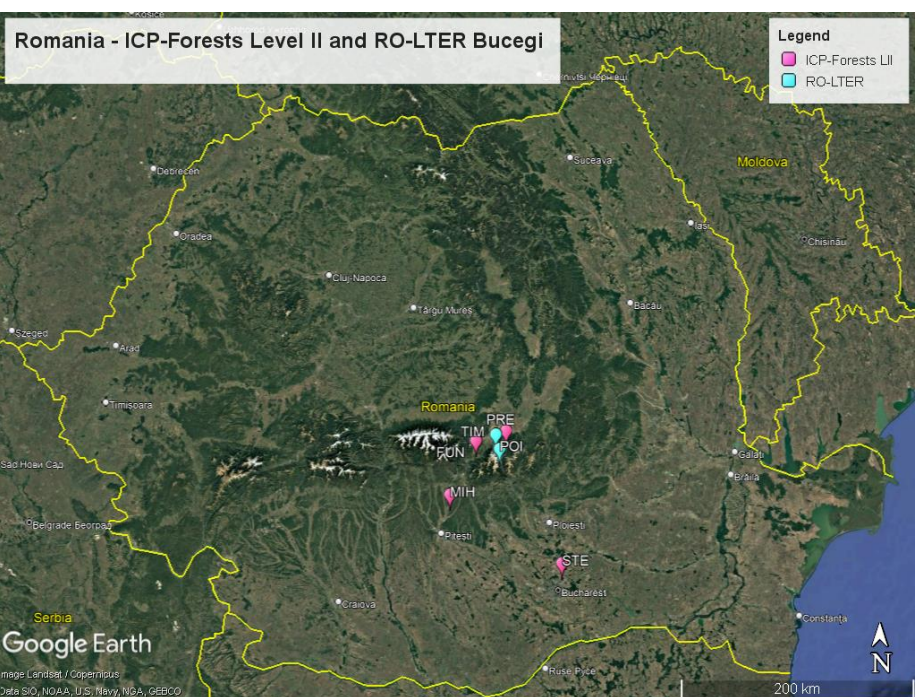
Ștefănești (STE) and Mihăești (MIH). Dominated respectively by *Quercus robur* and *Carpinus betulus*, and by *Quercus petraea*. Elevations 97-535 m.

2 Beech Forests

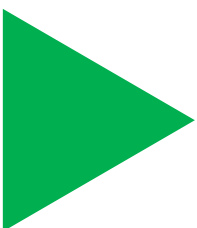
Fundata (FUN), Poiana Stâinii (POI). Dominated by *Fagus sylvatica*. Elevations 1270-1322 m.

2 Spruce Forests

Timeni Grof (TIM), Predeal (PRE). Dominated by *Picea abies*, *Abies alba*. Elevations 1109-1200 m.



Diversity and biomass of ground fallen epiphytic fruticose lichens



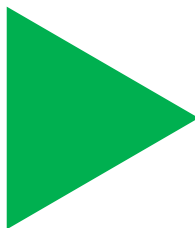
Epiphytic fruticose lichens that had fallen to the ground were detected at 5 out of the 6 sites.



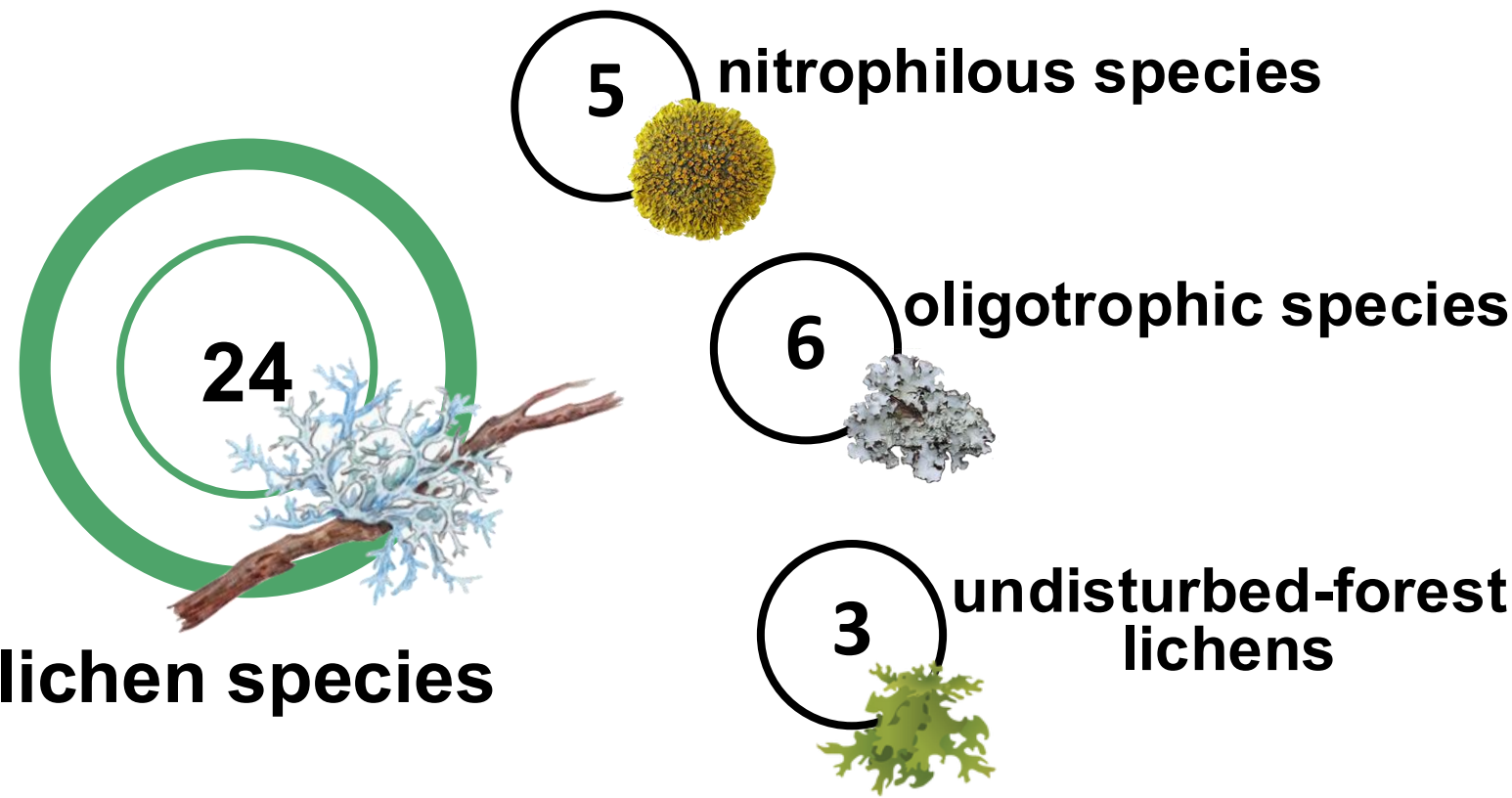
Forest type	Site code	Lichen species	Abundance (% of subplots)	Total weight (g)
Oak forest	STE		0	0.000
	MIH	<i>Evernia prunastri</i>	20	0.254
Beech forest	FUN	<i>Pseudevernia furfuracea</i>	10	0.465
	POI	<i>Pseudevernia furfuracea</i>	100	14.6
Spruce forest	TIM	<i>Pseudevernia furfuracea</i> , <i>E. prunastri</i>	90	4.42
	PRE	<i>Pseudevernia furfuracea</i>	90	2.07

- Two species : *Pseudevernia furfuracea* and *Evernia prunastri*.
- Their abundance was between 10% (FUN) and 100% (POI) of the subplots.
- Cumulated dry biomass varied from 0,254 g (MIH) to 14,6 g (POI).

Lichen diversity on lower trunks (LDV method)

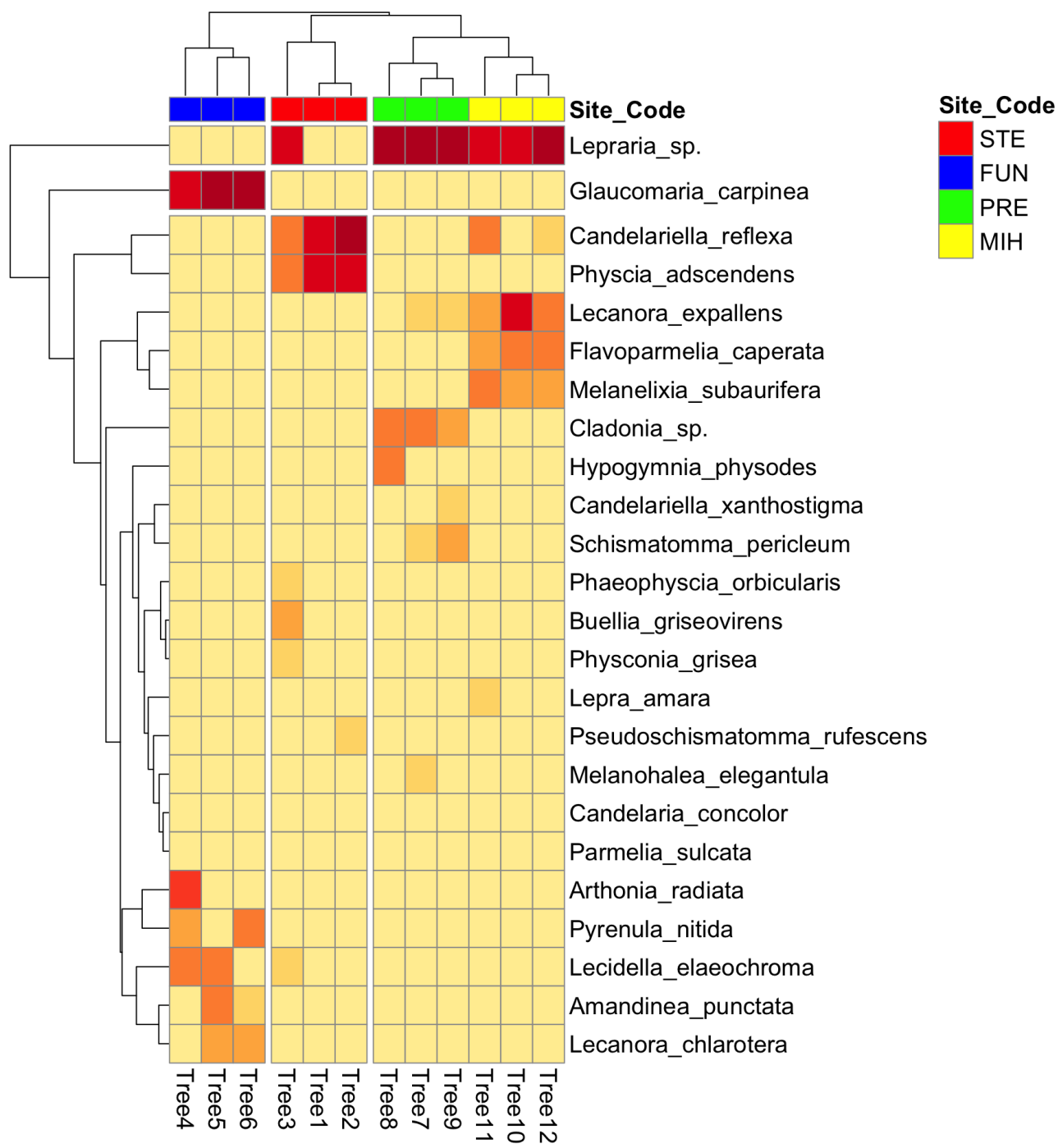
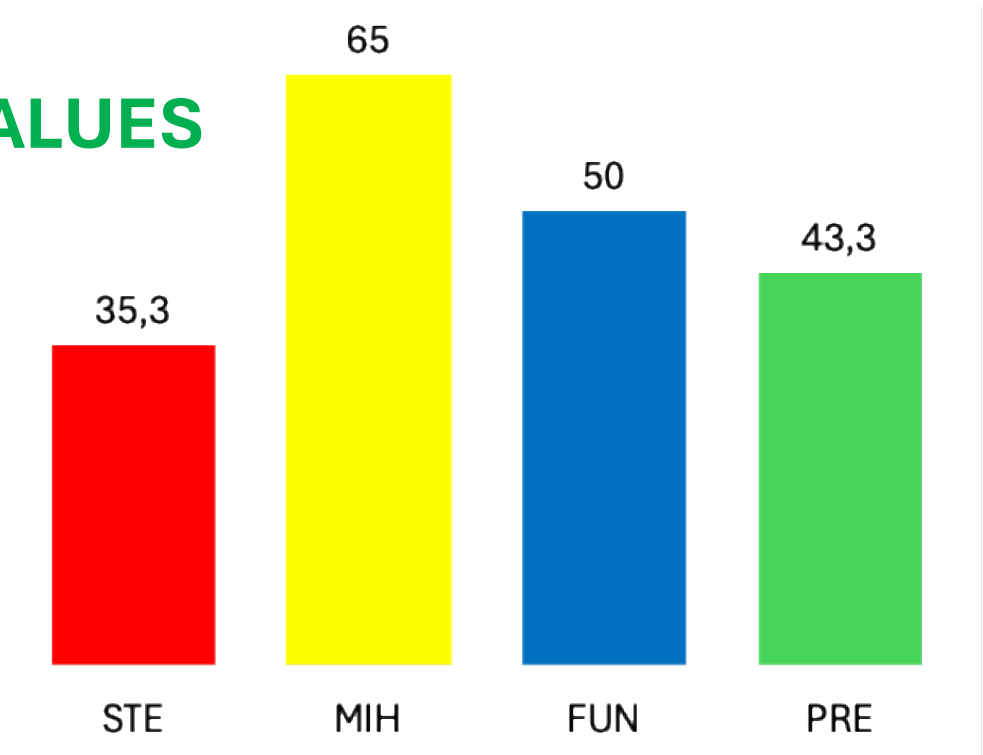


The Lichen Diversity Value (LDV) method was applied at a subset of four sites (STE, FUN, PRE, MIH).



LICHEN DIVERSITY VALUES

The average LDVs are between 35.3 and 65, corresponding to the oak forests of Ștefănești and Mihăești, respectively.



LIST OF SPECIES

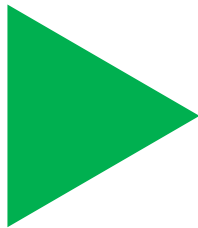
- 6 oligotrophic species (25%): *Buellia griseovirens*, *Hypogymnia physodes*, *Lecanora expallens*, *Pseudoschismatomma rufescens*, *Pyrenula nitida*, *Schismatomma pericleum*).
- 5 nitrophytic lichens (21%): *Candelaria concolor*, *Candelariella reflexa*, *Phaeophyscia orbicularis*, *Physcia adscendens*, *Physconia grisea* subsp. *grisea*).
- 3 species occurring on old trees in ancient, undisturbed forests or in semi-natural habitats: *Pseudoschismatomma rufescens*, *Pyrenula nitida*, *Schismatomma pericleum*.



CLUSTER ANALYSIS RESULTS

- The cluster analysis clearly distinguished the four forest sites.
- The FUN beech forest is most distinct from the other sites, for the dominance of crustose species that are common in beech forests.
- The STE oak forest stands out from the other sites with its distinct species composition. The nitrophytic species *Candelariella reflexa* and *Physcia adscendens*, are most prevalent here.
- MIH and PRE are closely related. Although PRE is a spruce forest, it is closely related to the MIH oak forest site, with both sites showing higher levels of the crustose *Lepraria* sp.

Viability of the indicator species *Lobaria pulmonaria*



We found *Lobaria pulmonaria* only in the forest site of Poiana Stâinii (RO-LTER network), where it is present on more than 5 beech trees.



Viability and conservation parameters	Abundance
Abundance of <i>Lobaria</i>	From sporadic to abundant
Presence of juvenile thalli (<2cm)	sporadic
Presence meristematic lobes	abundant
Presence of vegetative propagules	abundant
Presence of fruiting bodies	absent

- Lobaria* was from sporadic (4-10 thalli per tree) to abundant (>10 thalli).
- The specimens showed good vitality and conservation, with abundant meristematic lobes (>10 lobes) and well-developed dimensions.
- Baby thalli (< 2cm) were sporadic (<10 baby thalli per tree).
- Vegetative propagules were abundant (>10 thalli per tree) while apothecia were absent.



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