

Lichen conservation in the Plant Micro-reserve Network of the Valencian Community (E of Spain)

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Introduction

The Plant Micro-Reserves (PMR) of the Valencian Community have become the world's largest network of small-protected areas, primarily focused on the conservation of vascular plant and their habitats. This pioneer project for in situ plant conservation was developed in the early 90's and the first PMRs were declared in 1998. Over time, this network has grown to include 312 sites, covering 24-68 km², which represent approximately 0.1% of the regional surface. Despite the small surface of the network, Valencian PMRs include 69,8% of total native flora (up to subspecies level) and a high percentage of Spanish endemic plants (80,7%)(Laguna & al., 2021).

Although PMRs were originally designed with vascular plant conservation in mind, they also shelter a significant diversity of rare or threatened cryptogams. The proposal to create micro-reserves for cryptogamic flora (Puche & al., 1998; Atienza & al., 2001) confirmed the interest of this figure as a tool for conservation of fungi, lichens and bryophytes. In fact, PMRs agrees with other initiatives based on areas of high interest and small extension, such as important plant areas (IPA) or their equivalent for bryophytes (IBrA)(Anderson, 2002; Ravera, 2011; Garilleti & Albertos, 2012). Consequently, the network of PMRs could also be effective in the conservation of cryptogamic biota in general and lichen diversity, in particular.

Objectives

- Prepare the preliminary catalogue of the lichen biota in the PMR network.
- Evaluate the representation of the species included in the Red Lists of lichens and lichenicolous fungi proposed for Spain and Portugal (Atienza & al., 2017) and for the Valencian Community (Atienza & Segarra, 1999, 2002).

Results

The PMR network of the Valencian Community includes 2926 populations of **386 lichen-forming and 4 lichenicolous fungi**. These results are very preliminary, because only 141 PMR (45,2%) have information on their lichen biota. In addition, only some areas have been subject to exhaustive sampling and systematized studies. So, nearly 40% of the PMRs considered for the analysis have fewer than 10 species recorded; in the opposite situation, only 8% and 3% have current catalogues with more than 50 or 75 species, respectively (Fig. 2).

Even so, the current catalogue confirms that 46,1% of the lichen-forming fungi at regional level have at least one population within the PMR network. Only 4,3% of lichenicolous fungi known in the Valencia Community are present. The afore mentioned figures become even more remarkable when the size of the studied area (1109 ha, 0,05% of regional surface) is considered. The floristic catalogue is available online ([link](#)/QR code).



In the current catalogue, 18 species have been exclusively reported in the Valencian Community within PMRs (Fig. 4) and 25 species are included in the Red List of lichens of the Valencian Community (Fig. 5): 1 Critically Endangered (CR), 9 Endangered (EN), 9 Vulnerable (VU), 4 Least Concern (LC) and 2 Data Deficient (DD).

All these results highlight the role of the PMR network as an effective conservation tool for lichens, particularly for rare or threatened species.

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Figure 1. Plant Micro-reserve (PMR) Network in the Valencian Community (E of Spain). The dot inside the white dots indicate the 145 PMRs with lichen information.

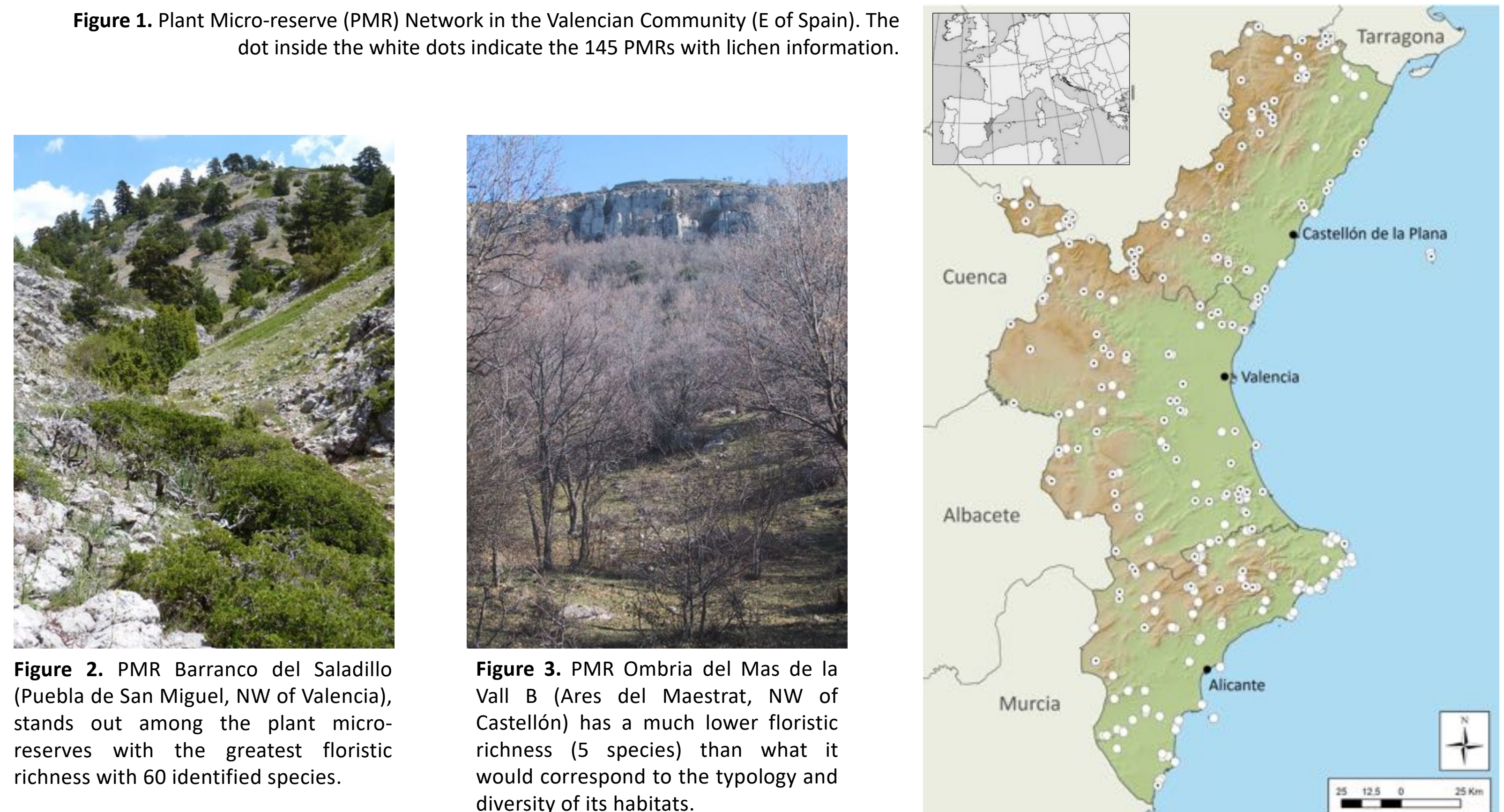


Figure 2. PMR Barranco del Saladillo (Puebla de San Miguel, NW of Valencia), stands out among the plant micro-reserves with the greatest floristic richness with 60 identified species.

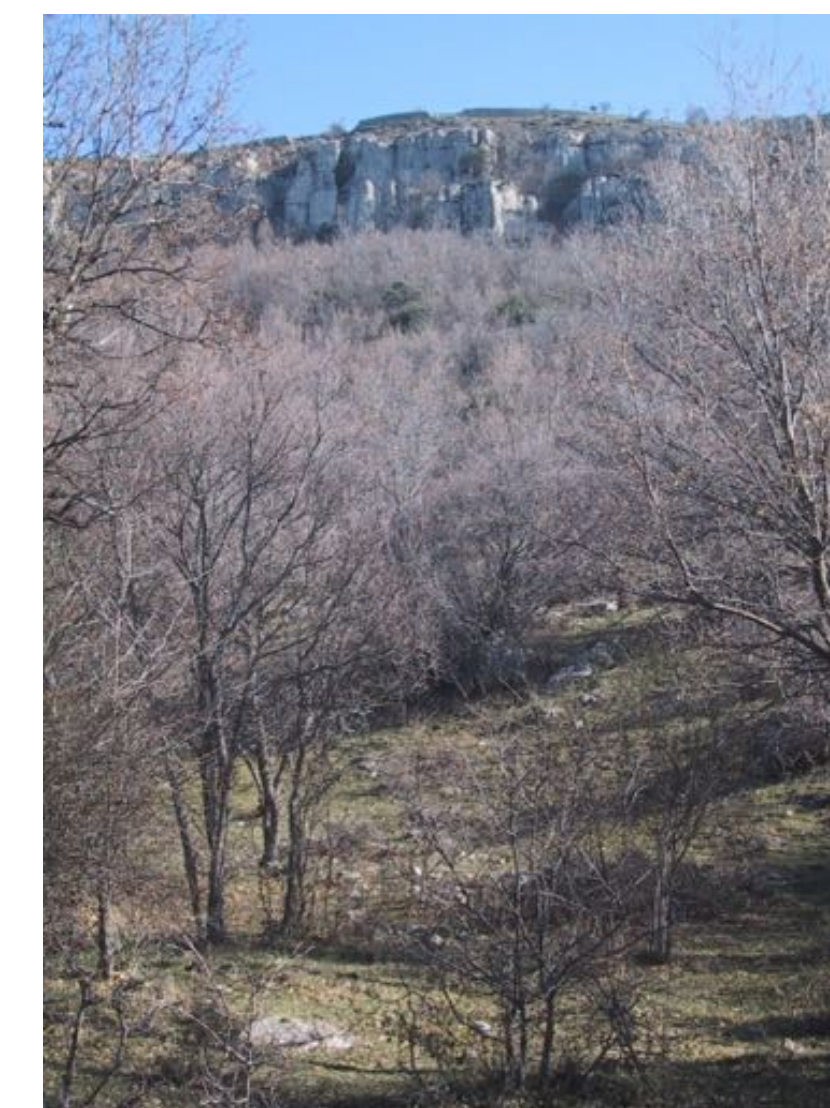


Figure 3. PMR Ombria del Mas de la Vall B (Ares del Maestrat, NW of Castellón) has a much lower floristic richness (5 species) than what it would correspond to the typology and diversity of its habitats.

Materials and methods

The preliminary catalogue of lichen-forming and lichenicolous fungi in the Valencian PMR network has been compiled from the data stored at the Biodiversity Data Bank of the Valencian Community (BDBCV; <https://bdb.gva.es>). This repository of regional biodiversity information holds more than 2.6 million records of 20890 species. 55000 of these records belong to 932 lichen-forming (838 taxa) and lichenicolous fungi (94 taxa), that can be considered the regional checklist. The catalog includes all BDBCV records with place names shown as "MRF official name of the micro-reserve" (BDBCV, 2023).

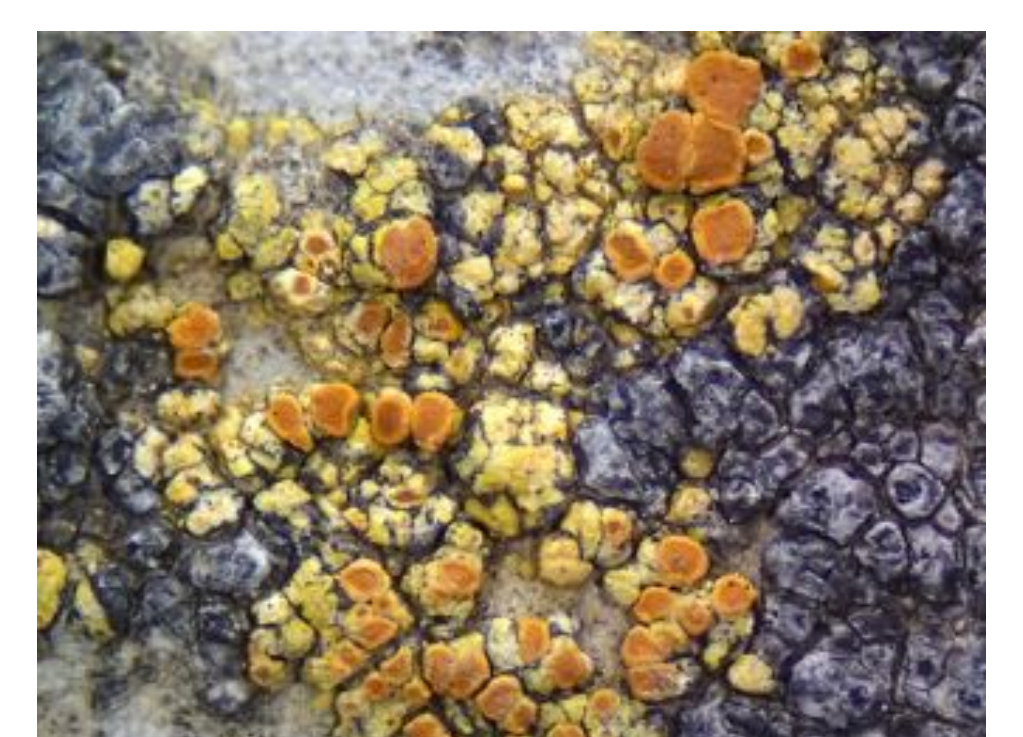
The nomenclature and species authorities were retrieved from Index Fungorum (IF, <http://www.indexfungorum.org>) or Nimis (2023) for those taxa not confirmed by IF.



Rhizocarpon umbilicatum PMR Barranco del Saladillo (Puebla de San Miguel, Fig. 2)



Anema tumidulum. PMR Font dels Horts (Ares del Maestrat, NW of Castellón)



Caloplaca cacuminum. PMR Alto del Viso (Alpuente, NW of Valencia)



Ochrolechia alboflavescens. PMR Pino de Vicente Tortajada (Puebla de San Miguel, NW of Valencia)



Straminella varia. PMR La Unde-Palomerias-C (Ayora, CW of Valencia)



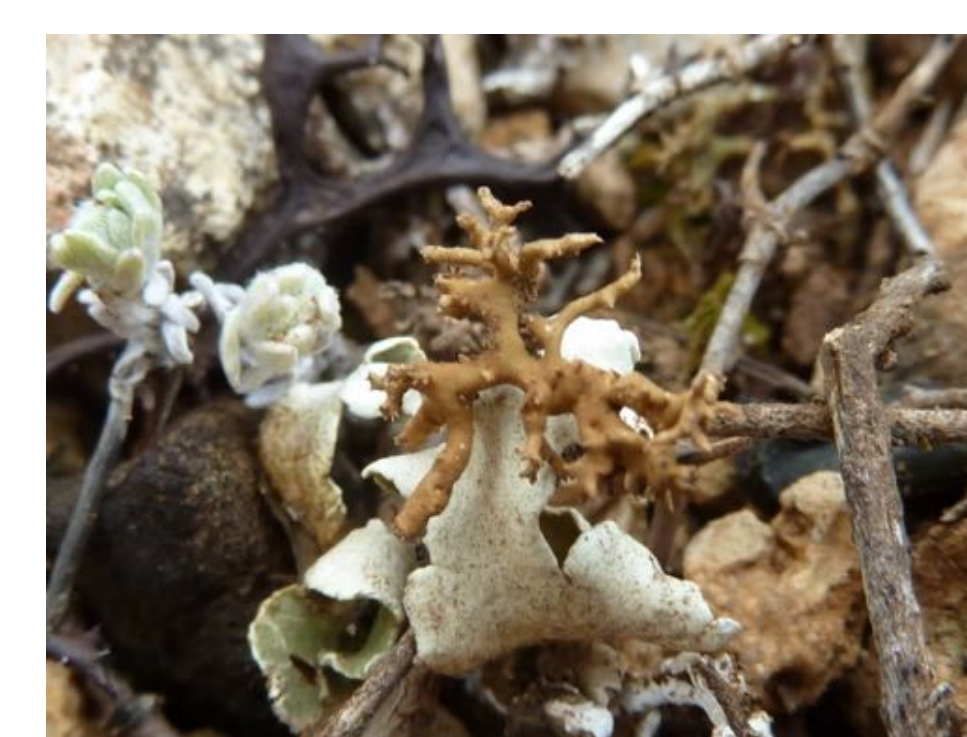
Enchylium ligerinum. PMR El Rivet (Benassal, NW of Castellón)

Figure 4. The current catalogue includes 18 species that are only known at a regional level in areas protected by Plant Micro-reserves. Most of these species are very rare in the Valencian Community and could meet the criteria to be included in IUCN Red List Categories (Fig. 5). Pictures from ITALIC (Nimis, 2023).

Figure 5. The Plant Micro-reserve Network hosts one or more populations of 25 species included in the Red List of lichens of the Valencian Community (Atienza & Segarra, 1999, 2002). PMR's protective measures on phorophytes and substrates ensure an effective tool for the conservation of threatened species of lichen-forming fungi.



Acarospora placodiformis (EN). MRF Miramontes (Villena, W of Alicante)



Circinaria hispida (EN). MRF Alto de las Barracas (Puebla de San Miguel, NW of Valencia)



Fulgensia poeltii (EN). MRF Dehesa de Cortes (Cortes de Pallás, C of Valencia)



Lecidea circinarioides (EN). MRF Castillo de Jalance (Jalance, C of Valencia)



Solorina saccata (VU). MRF Portell de l'Infern (La Pobla de Benifassà, N of Castellón)



Diploschistes diacapsis (LC). MRF Cabezo de la Sal-A (El Pinós, W of Alicante)