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Editorial: Overcoming the Global Climate Crisis: Solutions to Minimize the Loss of Mediterranean Plants

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Editorial on the Research Topic Overcoming the Global Climate Crisis: Solutions to Minimize the Loss of Mediterranean Plants

Mediterranean-climate regions are home to significant levels of plant diversity and endemism that are challenged by the threats of the modern world: habitat loss and fragmentation, high human population growth, and overexploitation of natural resources. Because of the fast rate of changes occurring in its ecosystems, many plants are threatened, and the trend is to worsen throughout the century (Muñoz-Rodríguez et al., 2016; Habel et al., 2019; Abeli et al., 2021). By 2100, this area will experience the highest biodiversity loss of all terrestrial biomes (Sala et al., 2000). In this context, and with the Damocles sword of climate change, it is urgent to explore new perspectives to prevent and reduce the loss of Mediterranean plants.

Given the rapid loss of biodiversity, measurement tools must be used to understand the magnitude and evolution of the process and to establish species priorities. Molina-Venegas et al. provide new ideas of how phylogenetic studies can help to detect and prevent clades of species that seem more prone to decline, helping to anticipate the risk of extinction. The results show that the risk of extinction tends to be concentrated in a few clades (i.e., Caryophyllales: *Armeria*, *Limonium*, *Silene*, etc.) although no association was found with IUCN categories. Nevertheless, this study proposes a priority for the conservation of habitats where these phylogenetic branches are concentrated, also suggesting expanding the focus to the entire Mediterranean endemic flora since the clades at greatest risk are widely distributed throughout this hotspot.

The design and implementation of conservation tools also require the reintroduction of native species or the reinforcement of their natural populations. However, this important issue is often challenged by the low levels of successful seedling establishment. In this context, Cortinhas et al. study the use of eco-friendly soil technologies, as an innovative sustainable engineering method for the reintroduction of the endemic halophyte *Limonium daveaui* in its native habitats. This approach uses cost-effective subproducts to enhance soil fertility and structure, useful for a circular economy system solution. They show promising results for future *in situ* conservation studies highlighting the potential of using new interdisciplinary approaches for plant conservation.

The challenge to conserve the Mediterranean's diversity is also linked to human activities and the increasing popularity of outdoor leisure activities in recent decades is affecting plant diversity. In this line, deCastro-Arrazola et al. analyze the pressure of sport climbing on cliff habitats identifying sites where climbing represents a potential threat, as well as priority species on which future conservation efforts should focus. This provides a valuable starting point for better climbing practices, establishing a balance between conservation and the sustainable use of rock-climbing habitats.

Understanding the ecological factors driving species' rarity is crucial for the conservation of biodiversity. Although rare species are the first to become extinct following human-induced disturbances, their functional importance and many of their basic features are often unknown. Serrano et al. show the importance of using ecological data for the protection of an endangered, hyperaccumulator plant species, *Plantago almogravensis*. They provide a list of recommendations to foster the survival chances of this species, that could also be expanded for the conservation of other metalliferous-tolerant plants.

Finally, Draper et al. challenge current conservation policies that have traditionally highlighted hybridization as a threat to the survival of species and dismiss the protection of hybrids. The study shows that, despite negative connotations, hybridization has been scarcely linked to extinction according to IUCN Red Data assessments. Considering the large evidence that sustains the importance of hybridization in species diversification, and how climate change might increase its presence (Vallejo-Marín and Hiscock, 2016; Marques et al., 2018), it seems important to create conservation policies that tackle how to deal with this process. Re-opening the debate involving the conservation

of hybrids would be important since they might be key for surviving in changing conditions.

While these different studies already provide several conservation-oriented approaches and new perspectives for the conservation of the Mediterranean flora, we see a great benefit from processes that encourage interactions and collaborations with managers, policymakers, and the public. The need to minimize and reverse the loss of biodiversity calls for a collective response if we want to foster the conservation of these unique, critical ecosystems.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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