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Teaching and enriching younger generations perception of soil ecosystems and dryland restoration through soil biocrusts

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Soils are connected to key ecosystems services such as biomass production, nutrients supplying and biodiversity conservation. Critical to human life and nature preservation, soil health, sustainable management, and restoration are central topics to achieve the Sustainable Development Goals proposed by the United Nations in 2015. Despite the active roles of the scientific community, land planners, and stakeholders for advancing science and developing applications to achieve global restoration goals, there is a lack of public perception in relation to the importance of soils and their roles in ecosystem conservation and restoration. For this reason, communicating these concepts to younger generations can be critical to promote actions for soil conservation and restoration in society. In this context, we used the concepts of soil biology and ecosystem functions, with a particular focus on soil biocrust communities, as the central topics for our laboratory's contribution to The L'Oréal Girls in Science Forum (LGSF) 2018 and 2019. Biological crusts communities (also known as biocrusts) are not commonly known by the public but are extremely important for soil establishment, succession, nutrition, and control of abiotic stress. The LGSF program encompasses a collaboration between L'Oréal Australia and the University of New South Wales, aiming to raise the profile of science as an attractive career option for them in the future. With a large number of young students attending this event, we took advantage of this opportunity to teach them about soil sustainability and highlight biocrusts' structure and composition, as well as sensitiveness to anthropogenic disturbances, and their potential for land restoration. The presentation was divided into stations or stands, starting with a showcase of degraded lands in Australia due to mining activities, and subsequently introducing real biocrusts portions while underlining important functions, components, and structure. Lastly, we showed them 'alive' cyanobacterial communities, which are the primary colonizers of biocrusts, and can be applied combined with seed enhancement technologies to improve restoration. Seeds of endemic plants from Australia and bio primed with cyanobacteria were presented together with the contrast treatment (control), proving, and emphasizing the ability of cyanobacteria for producing plant growth hormones and contributing to revegetation. Finally, cyanobacteria-made pellets were exposed in Petri dishes together with pictures of regions successfully colonized after their introduction. The whole pedagogical experience was enriched with matching games, where the girls were able to recognize Australian endemic trees and main cyanobacteria related to soil structure and nutrition. This activity pointed to the importance of preserving soil biological

communities in the context of land restoration, to ensure the provision of key ecosystems services provided by soils.