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Strategies for the conservation by biotechnological approaches of *Abies nebrodensis*, a relict conifer of Sicily

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Abstract:

Conservation of plant biodiversity is an important worldwide strategy, especially for species at risk of extinction such as the Sicilian fir (*Abies nebrodensis*). *A. nebrodensis* is an endemic conifer of the Sicilian mountains, whose relic population consists of only 30 mature trees in the “Parco delle Madonie” (North-Central Sicily), spread over an area between 1,400 and 1,650 m above sea level. The species is considered critically endangered by the International Union for Conservation of Nature (IUCN) due to dramatic genetic erosion and poor natural regeneration. This species is characterized by very slow growth, non-stable cone production and low seed germination due to a high percentage of empty seeds. Therefore, the study initially focused on X-ray analysis to distinguish between empty and full seeds to ensure the storage of seeds containing embryos at -18°C or at ultra-low temperature (-196°C). To obtain morphogenic callus lines, the date of cone collection was identified to extract the immature embryos and introduce them in vitro. Induction of morphogenic callus was obtained on DKW medium (Driver and Kuniyuki, 1984) enriched with 2,4-dichlorophenoxyacetic acid, while proliferation was tested on different media. The preliminary results underline the ability of immature embryos to form callus. Moreover, an effective protocol for pollen cryopreservation was developed by conducting appropriate germination tests before and after the immersion in liquid nitrogen. The outcomes achieved with the Sicilian fir conservation project will open the way to similar strategies to protect other critically endangered coniferous species.

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