



# Decisive *in situ* and *ex situ* conservation strategies to protect the critically endangered Madonie Fir (*Abies nebrodensis*) in Sicily.



LIFE18 NAT/IT/000164  
01/08/2019 - 31/07/2023

LIFE4FIR is a project co-financed with the contribution of the LIFE financial instrument of the European Union

## Introduction

*Abies nebrodensis* (Lojac.) Mattei is a critically endangered endemic species of Sicily (Fig.1). The relic population is made up of only 30 adult trees and is highly vulnerable due to:

1. dramatic genetic erosion;
2. fragmentation and presumed self-fertilization of trees;
3. poor natural regeneration (Fig.2);
4. the superficial and rocky soil;
5. localized soil erosion;
6. grazing of wild herbivores and uncontrolled cattle.

The habitat of *A. nebrodensis* is part of the Natura 2000 network (habitat 9220\*, SCI Ita 020004).

## Objectives and strategy

The main purpose of the project is:

1. to increase the genetic diversity of the offspring;
2. to implement a reforestation plan to restore the dynamic structure of the population;
3. make use of innovative strategies for the *ex situ* conservation of the species.



Fig. 1 *Abies nebrodensis* in its natural habitat



Fig. 2 Natural regeneration

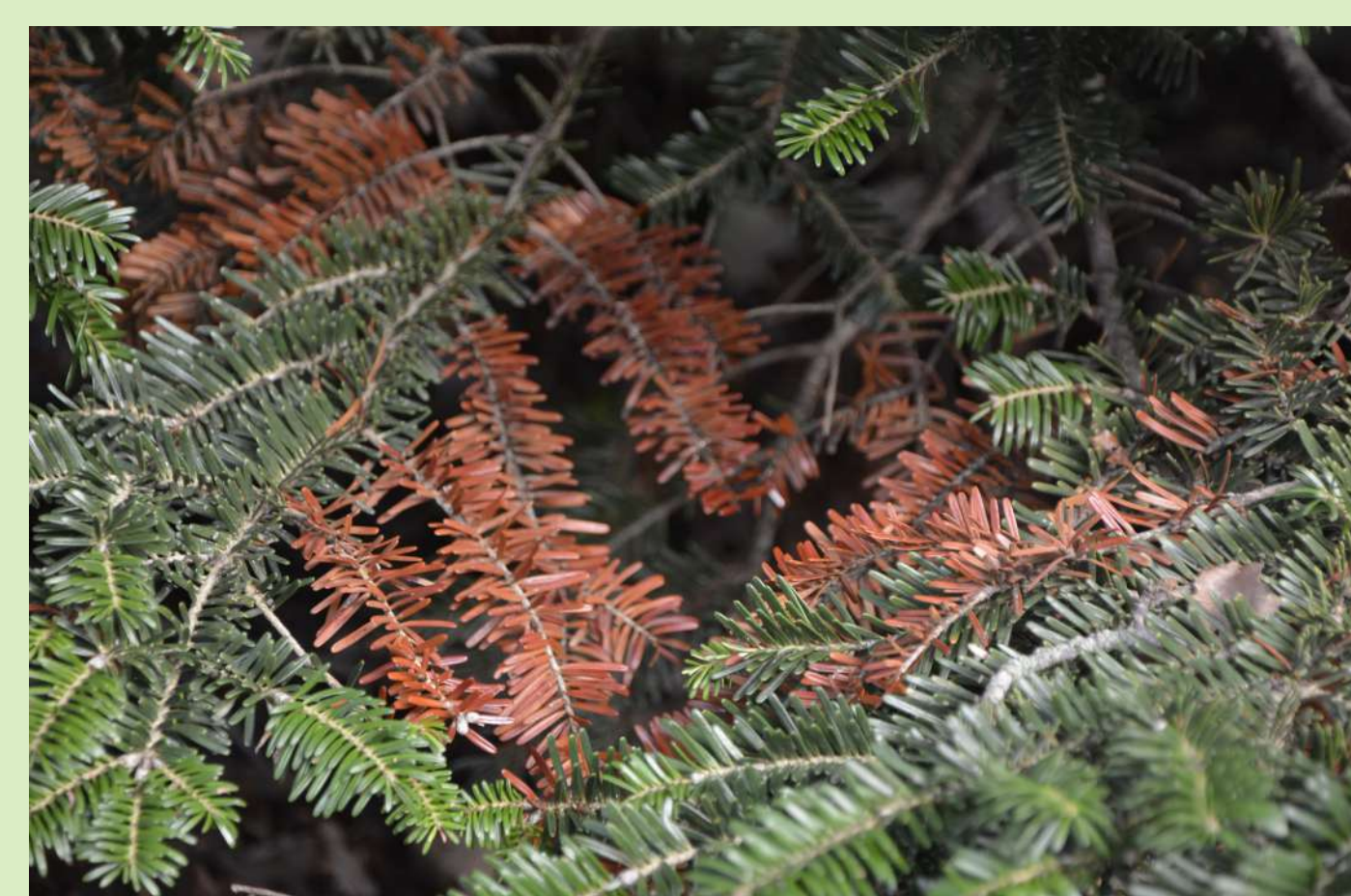


Fig. 3 Foliage and shoot blight

## Actions

1. Support to and protection of the relic population (adult trees and natural regeneration) through the control of biotic, abiotic and anthropic disorders (pathogens and parasites, localized soil erosion, grazing of wild herbivores - Fig. 3);
2. Increase the genetic diversity of the offspring by promoting the cross pollination between trees of the natural population and through the selection of pure and outbred seedlings, verified by genetic analysis (Fig.4). A clonal orchard will also be established, adequately designed to foster cross-fertilization between genotypes and to obtain improved seed in the future;
3. Breeding in the nursery of selected, healthy and vigorous seedlings through mycorrhization and control of biotic and abiotic disorders (Fig.5);
4. Reforestation in 10 suitable areas of the Madonie Park with the use of 4000 selected plants, to create re-diffusion cores (Fig. 6);
5. *Ex situ* conservation of the germplasm through the implementation of a seed bank and a cryobank for the long-term conservation of pollen, seeds, isolated embryos and embryogenic callus lines of *A. nebrodensis* (Fig. 7).

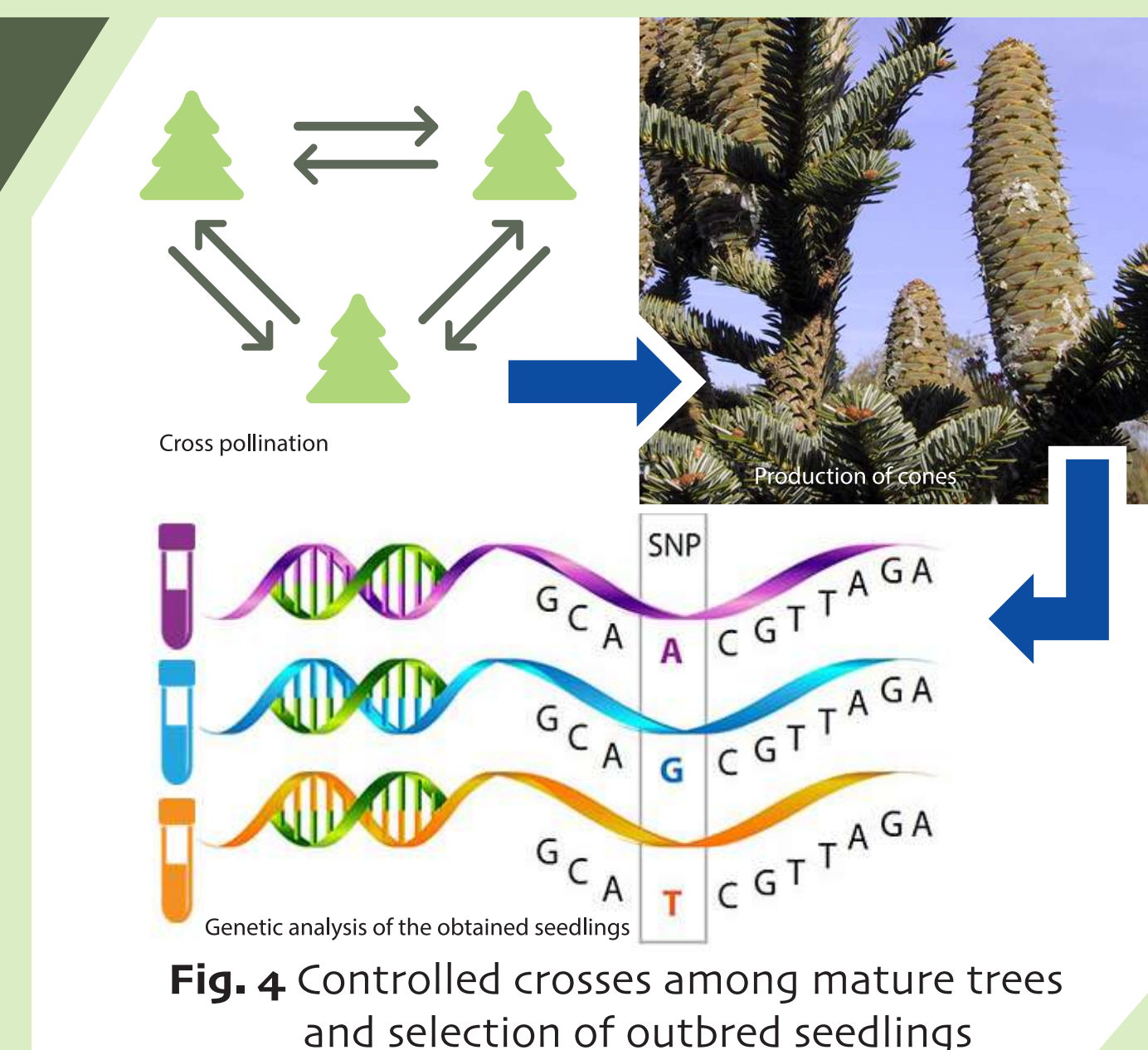


Fig. 4 Controlled crosses among mature trees and selection of outbred seedlings



Fig. 5 Seedlings in the Piano Noce nursery



Fig. 7 Cryobank for the long-term conservation of *A. nebrodensis* germplasm

## Replication

The project is aimed at developing a reference model of best practices to transfer actions and results of LIFE4FIR for the protection of other threatened Mediterranean conifers.

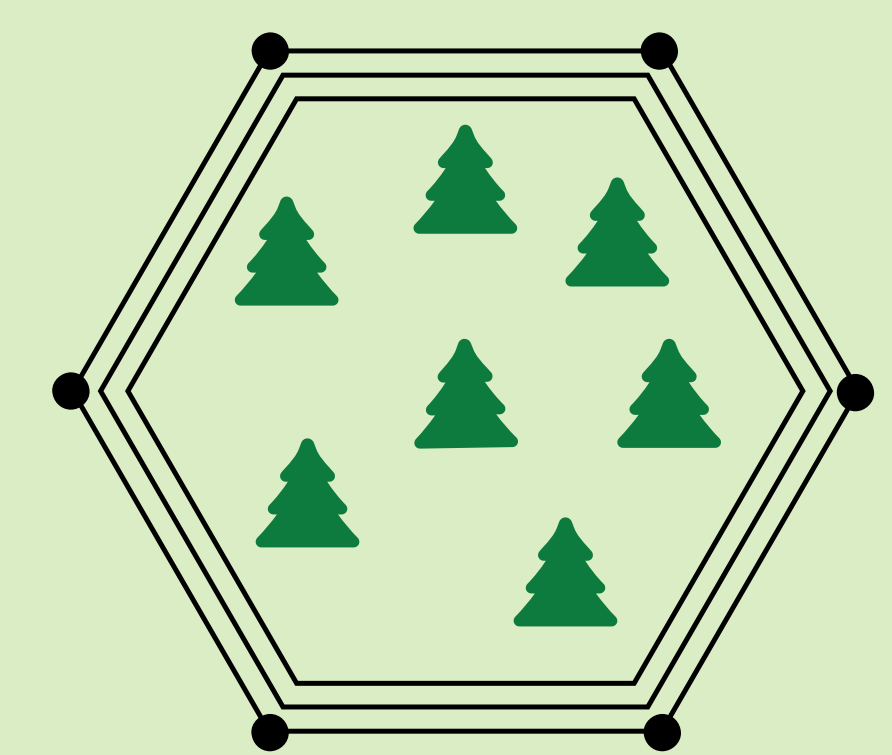


Fig. 6 Reforestation plots

## Impact

The implementation of the project will promote and encourage environmental education and policy, training, work, tourism and social inclusion.

PROJECT COORDINATOR  
Dr. Roberto Danti, CNR IPSP  
[roberto.danti@ipsp.cnr.it](mailto:roberto.danti@ipsp.cnr.it)

BENEFICIARIES OF LIFE4FIR

