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B.1 Study of the fungal microorganisms of *Abies nebrodensis* twigs and needles in its natural habitat

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Keywords: mycobiome, plant pathology, fungal ecology, Sicilian Fir, endangered species.

Fungi play a crucial role in terrestrial ecosystems as symbionts, commensal colonizers, saprobes or acting as plant pathogens with many species persistently or temporarily inhabiting the phyllosphere of the vegetation. In this study we investigated the mycobiome of the twigs and leaves of *Abies nebrodensis*, an endemic species located in the northern part of Sicily (Italy) in the Madonie Natural Park, represented only by 30 adult trees and reported as critically endangered by IUCN. In a first survey, the endophytic fungi present on blighted needles of the adult trees were molecularly identified through DNA barcoding; results indicated that most of the fungal microorganisms associated with the symptoms of needle desiccation and reddening are secondary pathogens or saprophytes, with a large prevalence of the genera *Cytospora* and *Rhizosphaera*. To deeper investigate the role of the entire fungal community, forty samples from 10 selected trees were analyzed by high throughput sequencing (HTS): the Illumina-generated ITS2 sequences identified a total of 568 genera and 793 species. A more in-depth ecological analysis has been performed, exploring the entire fungal community related to the organ examined (twigs or needles), the micro-habitat of trees (rocky soil or beech forest), and the health state the twigs (symptomatic vs asymptomatic).

B.2 Novel bacteria as a threat to Salento's holm oaks

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Keywords: Holm oaks, pathogens, ecosystems, Acute Oak Decline, conservation.

In recent years, desiccations in holm oak (*Quercus ilex* L.) woodlands in Salento were frequently observed in rural areas. This phenomenon is characterized by peculiar symptoms of crown as thinning of the canopy, epicormic shoot on branches, while trunks showed insect exit holes and, under the bark, larva galleries exclusively associated with the presence, at the level of the outer bark, of longitudinal cracks from which an amber-coloured liquid leaks. Three bacteria were found in the exudates, namely *Brenneria goodwinii*, *Gibbsiella quercinecans*, and *Rahnella victoriana*, which are known pathogens of oak trees but yet undetermined to the authors' knowledge in the Mediterranean area. The symptomatic description and the bacteria found correspond to the phenomenon first described in the UK known as 'Acute Oak Decline' and leads to the death of the affected oaks within a few years. Deepening our knowledge of this phenomenon and investigating the geographical distribution of these pathogens is essential in order to protect the Salento forests and develop management strategies.