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LANDSCAPE GENOMICS TOOL FOR SUSTAINABLE FOREST MANAGEMENT UNDER A CHANGING ENVIRONMENT

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forest genetic resources, genetic diversity, landscape genomics, adaptation, Sustainable Forest Management

Forest ecosystems represent complex adaptive systems that cover a wide range of climatic zones and form different forest types. Forest areas are important for ecosystem services, ranging from economic and social serving

to the biodiversity they host and represent. Climate change, unsustainable forest management, invasive species, urbanization, and fragmentation reduce forest biodiversity, may adversely affect genetic diversity, and put at threat the future adaptive potential and sustainability of forests ecosystems. The genetic diversity in locally adapted forest is essential for adapting to changing environmental conditions. Nowadays, many forest species were found to be threatened or subject to genetic erosion, making forests less resilient and compromising future adaptability to changing environmental conditions. Therefore, it is extremely important to provide a sustainable forest management (SFM) for a correct sustainable use of forest products but preserving biodiversity. In particular, forest genetic resources (FGR) are the basis of the long-term evolutionary processes maintaining the adaptive potential of forests. LIFE SySTEMiC (LIFE18 ENV/IT/000124) examines best close-to-nature forest managements regarding FGR in different European Forest Types, for diverse forest management systems comparing to non-managed forests to preserve adaptability of forest ecosystems. The principal aim is to use a combination of advanced landscape genomics, applied genetics, modelling and silvicultural methods resulting an innovative Genetic Biodiversity and Silvicultural model (GenBioSilvi) to be used as tool for a SFM. The Project involved a multidisciplinary study approach: (i) the study concerning the adaptive component of the genetic variability of the stands; (ii) the study of biodiversity at species and ecosystem level obtained through the study of the fungal and microbial communities of the forest soil; (iii) the study of past and current silvicultural management. The information processed on biodiversity and genetic characterization enabled the definition of biogenetic indicators useful in providing the best adaptive management of the forest, with respect to climate change, also considering the species and different silvicultural treatment conditions. Here, we have reported the results obtained at the end of the LIFE SySTEMiC project.