Soil biodiversity in artificial black pine stands after selective silvicultural treatments: preliminary results

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The decay of forest cover and soil erosion is a consequence of continual intensive forest exploitation, such as grazing and wildfires over the centuries. From the end of the eighteenth century up to the mid-1900s, black pine plantations were established throughout the Apennines' range in Italy, to improve forest soil quality. The main aim of this reafforestation was to re-establish the pine as a first cover, pioneer species. A series of thinning activities were therefore planned by foresters when these plantations were designed.

The project Selpibiolife (LIFE13 BIO/IT/000282) has the main objective to demonstrate the potential of an innovative silvicultural treatment to enhance soil biodiversity under black pine stands. The monitoring will be carried out by comparing selective and traditional thinning methods (selecting trees from below leaving well-spaced, highest-quality trees) to areas without any silvicultural treatments (e.g. weeding, cleaning, liberation cutting). The monitoring survey was carried out in Pratomagno and Amiata Val D'Orcia areas on the Appennines (Italy) and involved different biotic levels: microorganisms, mesofauna, nematodes and macrofauna (Coleoptera). The results displayed a significant difference between the overall biodiversity of the two areas. In particular, microbial diversity assessed by both biochemical (microbial biomass, microbial respiration, metabolic quotient) and molecular (PCR-DGGE) approaches highlighted different a composition and activity of microbial communities within the two areas before thinning. Furthermore, little but significant differences were observed for mesofauna and nematode community as well which displayed a higher diversity level in Amiata areas compared to Pratomagno. In contrast, Coleoptera showed higher richness values in Pratomagno, where the wood degrader Nebria tibialis specie dominated, compared to Amiata. As expected, a general degraded biodiversity was observed in both areas before thinning.