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BOOK OF ABSTRACTS

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Linking agricultural practices to soil functioning: insights from physico-chemical and biological indicators

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Sustainable agriculture strongly depends on plant - soil - microorganisms interactions to regulate nutrient cycling, enhance stress resilience and maintain biodiversity. Recent researches underscore the strategic role of microbe-rich soil zones, as rhizosphere and rhizosheath, which act as dynamic interfaces supporting nutrient turn-over and plant growth. In parallel, the adoption of pollinator-friendly plant mixes (PM) has emerged as a complementary strategy to boost above-ground biodiversity and strengthen landscape connectivity. This two-year study aims to investigate how different soil management practices and plant types affect biological (enzymatic activities, 16S rRNA profiling) and physico-chemical properties in microbe-rich soil zones. Two field experiments were planned: 1) wheat cultivation under organic amendment and mineral fertilization (NPK) regimes and 2) two different PM, compatible with EU CAP ecoschemes, sown on untreated soil. For both experiments, control plot consisted of native spontaneous species without amendment/fertilization. Preliminary results from the first year revealed that: 1) soil management did not affect the investigated properties, although, soil treated with organic amendment started to show a different pattern in enzymatic activities respect to the other soil treatments; 2) PM significantly affected the microbial community metabolic activity and enhanced microbial richness, highlighting the dual ecological role of these plants in supporting both aboveground and belowground biodiversity. These findings emphasize the pivotal role of diversified plant communities and rhizosphere processes in sustaining soil functionality. Integrating plant–microbe interactions into management practices emerges as a key strategy for developing resilient and ecologically sustainable agroecosystems. This study was carried out within the Agritech National Research Center and funded from the European Union Next-GenerationEU (PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR) – MISSIONE 4 COMPONENTE 2, INVESTIMENTO 1.4 – D.D. 1032 17/06/2022, CN00000022). The content reflects only the authors' views and opinions, neither the European Union nor the European Commission can be considered responsible for them.