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Diversity, activity and biomass of soil microbial community of Mediterranean environment as affected by plant cover

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Soil microbial community plays a fundamental role in the ecosystem functioning, because it decomposes organic matter, determining the release of mineral nutrients in the soil and, consequently, influencing primary productivity and nutrient cycling. On the other hand, soil microorganisms may be affected by plant cover that influences chemical-physical properties of the soil. Plant cover changes are frequent in Mediterranean areas and mainly due to recurring fires and vegetation cutting, linked to land use changes or not. Aim of this research was to evaluate diversity, activity and biomass of soil microbial community in Mediterranean areas with different plant cover. The study was carried out in the Castel Volturno Nature Reserve (Southern Italy) dominated by dense high maquis (2.5-3 m-high) with gaps (probably due to recent fire or vegetation cutting) covered by scattered low shrubs (30-40 cm-high) or by herbaceous plant community. Soil was collected, in spring and autumn 2004, in near areas covered by three different plant cover types, i.e. high maquis, low shrubs and herbaceous plant community (dominated by leguminous species). Microbial diversity was evaluated as functional diversity and assayed as catabolic response profiles, obtained from short-term respiration responses to addition of several simple organic compounds to the soils. Data from catabolic response profiles were also used to calculate soil catabolic evenness by Simpson-Yule index. Microbial activity was evaluated as CO2 evolution from soil samples incubated in standard conditions (25°C, 55% of water holding capacity). Microbial biomass was evaluated as microbial C (Cmic). Moreover, because fungi are particularly sensitive to changes of ecological factors, fungal mycelium (to-

tal and active), fungal fraction of microbial carbon and fungal colonies forming units (CFUs) were also determined. Data showed that soil microbial community was affected by plant cover but also by sampling season. Soil covered by high maquis generally showed higher values of microbial activity, total and active fungal mycelium as well as of fungal fraction of microbial carbon, than other soils; whereas, soil from herbaceous plant community was characterized by the lowest values of total and active fungal mycelium and fungal fraction of microbial carbon. By contrast, the studied soils did not differ for total microbial biomass, functional diversity (catabolic response profiles and catabolic evenness) and fungal CFUs. Moreover, a decrease of total microbial biomass, fungal CFUs and microbial activity was generally observed in autumn, when the soil water content was lower, than in spring. A change in catabolic response profiles was also observed in autumn, compared to spring. On the contrary, fungal mycelium and catabolic evenness were similar in the two seasons and fungal fraction of microbial carbon was lightly higher in autumn than in spring. The results suggest that both spatial heterogeneity of plant cover and temporal changes of ecological factors influence microbial community composition, with fungal or bacterial component dominating in different microhabitats and in different times. However, changes in catabolic response profiles, that may indicate changes in community composition, were observed in the different seasons, but not in the different plant cover types.