UNIVERSITÀ DEGLI STUDI DI PADOVA

DAFNAE

Department of Agronomy Food Natural resources Animals and Environment

SUNRISE

An integrated approach to combine Soil biodiversity preservation, sUstaiNable agriculturalpRoduction, and photovoltaIc efficiency in a climate change ScEnario

Soils are one of the main reservoirs of biodiversity because they host the life-cycle ofmore than 40% of living organisms in terrestrial ecosystems, but soil biodiversity remainssignificantly undervalued. Soil plays a central role in achieving sustainable developmentand in the European Green Deal it is indirectly relevant for achieving climate neutrality in2050, preserving and restoring ecosystems and biodiversity. The recent increase in globalenergy demand, as one of the key drivers of climate change,has led to the development ofrenewable energy sources, but also to the competition on land use, particularly betweenagriculture and PhotoVoltaic (PV) system. Because of this potential conflict, the newEuropean Union (EU) Biodiversity Strategy for 2030 promotes the development ofeconomic models able to combine private and social-ecological interests to stimulateeconomic growth and, simultaneously, support ecosystem services, encouragingcombinations of energy production systems compatible with biodiversity conservation(European Commission, 2020). In this framework, the development of Agro-PhotoVoltaic(APV) system can be an efficient way of combining PV energy production and foodproduction on the same land area. Unfortunately, information and data on the effects ofAPV systems on soil biodiversity is dramatically lacking and should be implemented.Considering this baseline, the main object of this project is to evaluate and quantify theimpact of APV system on: i) soil biodiversity, ii) soil features and water dynamic, iii)ecosystem services. SUNRISE project focuses on soil biodiversity considered in a broadand comprehensive way because it assesses both organisms that are extremely important for the nutrient cycles, such as fungi and bacteria, and organisms that play key roles inmaintaining soil functioning, such as arthropods and earthworms. Beside the analysis ofthe relationship between APV and soil biodiversity, the project will evaluate the economicvalue of the soil ecosystem services affected by the APV from the perspective of thelandowner and society. SUNRISE experimental design considers different shadingconditions due to the surface of the solar panels on two particularly important crops(tomato and wheat). Field data on the effects of different shading levels of APV systemson soil biodiversity and soil water dynamics in relation to crop development will beobtained. The adopted methodologies will combine traditional techniques with state-of-the-art analysis methods, by

applying modern and rigorous approaches. Thanks to theheterogeneity of the team, SUNRISE project stands out for a strong interdisciplinarity thatguarantees its scientific quality and broad approach. The team has a strong femalecomponent that is identified not only in the PI but also in female researchers. This ensuresgender equality and allows for a more balanced approach at each stage of the project,including maximum attention to social aspects.

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