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Rainwater harvesting as climate change adaptation strategy for durum wheat production in Sardinia

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The Mediterranean region is widely recognized as a climate change hotspot, where, mainly due to the increase of CO2 concentration, both historical records and future climate models' projections reveal an increase of the daily average temperature and a reduction of the mean annual precipitation, with less frequent but more intense rainfall events. These changes could have strong impacts on the durum wheat production, and consequently to the food chain that derives from it. Water availability is expected to be the main limiting factor in the durum wheat growth, which is usually rainfed in Mediterranean region. On the other hand, CO2 increase may act as a counterbalance factor, by increasing the water use efficiency. In this work, within the framework of the H2020 European Union project ARSINOE ("Climate-resilient regions through systemic solutions and innovations"), we investigated the possibility to adapt durum wheat production to climate changes, compensating the rainfall reduction with emergency irrigation derived from a rainwater harvesting system, with the aim to keep constant the durum wheat production or alleviate the yield reduction. The Aquacrop model, a crop growth model developed by FAO's Land and Water Division, has been calibrated to reproduce the actual durum wheat production in the Campidano region in Sardinia (Italy), implementing the local climate and soil characteristics. The model has been then used to simulate the crop production in correspondence of different bias corrected future climate scenarios, which foreseen an average rainfall reduction and increase of average temperature and CO_2 concentration in the atmosphere. A rainwater harvesting system to collect rainfall from the rooftops or impervious surface within the cultivated area (100m2/ha) has been designed and the volume for potential emergency irrigation has been estimated year by year. Preliminary results show the importance of implementing rainwater harvesting systems to provide emergency irrigation and sustain durum wheat production in a context of climate changes.

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