THE RELATIONSHIP BETWEEN SOIL CO_2 EMISSIONS AND DAILY EVAPORATION UNDER DIFFERENT WEATHER SEASONS

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Carbon dioxide (CO_2) is one of the potent greenhouse gases found in agricultural soils and is one of the major contributors to the global greenhouse gas effects. The relationship   between soil CO_2 emissions and daily evaporation is extremely complex, and its net efflux is inseparably linked to the agro-climatic factors, especially soil moisture and temperature. In this study, we aim to examine the relationship between CO_2 emissions and evaporation and their seasonal variations determined in a lysimeter experiment. Sorghum and grapes were grown in precision weighing lysimeters in 3 replications. Results indicate that soil CO_2 fluxes showed evident seasonal variations across the year and seasons. The CO_2 efflux was highest at 0.3 $g^{-1}m^{2-1}h^{-1}$ with sorghum and 0.27 $g^{-1}m^{2-1}h^{-1}$ with grapes during the summer of 2023, while the lowest CO_2 effluxes were 0.03 $g^{-1}m^{2-1}h^{-1}$ and 0.02 $g^{-1}m^{2-1}h^{-1}$ during the winter of 2023. The trend is similar to   evaporation as high peaks were 4.22 mm day^{-1} with sorghum and 3.62 mm day^{-1} with grapes in summer, while lower peaks were 0.4 mm day^{-1} and 0.401 mm day^{-1}, respectively, in winter. There was a significant, strong positive correlation of soil CO_2 emission with evaporation at (r=0.87) under grapes, and a moderate positive correlation (r=0.46) under sorghum. Our study suggests that there is a significant relationship between soil CO_2 emissions and daily evaporation. Therefore, reducing evaporation through apt management techniques may stabilize CO_2 and reduce emissions. Furthermore, measuring one of these two parameters may   be the basis of the estimation of the other one.