Geophysical Research Abstracts
Vol. 19, EGU2017-14140, 2017
EGU General Assembly 2017

Sunflower N2O emissions under two different water regimes in Mediterranean climate

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Human activities are altering the atmospheric greenhouse gases (GHGs) concentration with negative effects on global climate and environment. Cropland represents about 12 % of earth's surface and largely contribute to GHGs production, in particular N2O, due to a massive use of nitrogen fertilization. In particular, agriculture and intensive livestock farming may significantly affect biogeochemical cycles included nitrogen cycle. However, it is often difficult to predict the total amount of fluxes caused by agricultural management, which impact on both the whole agro-ecosystem.
The objective of the experiment was to evaluate soil N2O fluxes under two different irrigation managements.
The experimental trial was conducted in a farm in surrounding of Naples, southern Italy. The crop monitored was sunflower for biomass uses. Two irrigation levels were performed: returning 100% (optimal irrigation) and 50% (deficit irrigation) of soil field capacity for the layer 0.0-0.50 m. 314 Kg ha-1 of urea fertilizer was supplied in two times: at sowing and 40 days later.
Before sowing, six autochambers were inserted 3 cm into the soil and connected to a gas chromatograph and a scanning apparatus. A program for chambers' management was implemented to monitor soil N2O fluxes measured different times of the day. Biometric parameters such as LAI, root depth, above- and below-ground biomass were monitored during the experiment.
Results shows that soil N2O fluxes were affected by irrigation regime; in particular, the deficit irrigation determined lower N2O fluxes compared to optimal irrigation but the total biomass production and yield were comparable between the two water regimes.
So low input farm management could be take in account to reduce the total N2O emission and maintain at the same time high productivity level in terms of biomass and yield.

Keywords: N2O fluxes, Irrigation schedule, sunflower