Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

EFFECT OF DIFFERENT MANURE APPLICATIONS AND WETTING-DRYING CYCLES ON CO_2 EMISSIONS FROM SOIL

Caner Yerli[1]*, Ustun Sahin[2]

[1]*Department of Biosystem Engineering, Faculty of Agriculture, University of Van Yuzuncu Yil University, Van, Turkey*
[2]*Department of Agricultural Structures and Irrigation, Faculty of Agriculture, University of Ataturk, Erzurum, Turkey*

Abstract

Organic carbon is transformed into CO_2 by various interventions applied to the soil and diffuse to the atmosphere. The manures which used unconscious under available soil moisture and temperature condition makes the soil microorganism activity increased. This causes CO_2 emission increase as well by oxidation of organic matter. In this study, it was aimed to evaluate different amounts of sheep (20, 40 and 60 t ha^{-1}) and poultry manure (15, 30 and 45 t ha^{-1}) under different wetting-drying cycles (irrigation intervals of 3, 6 and 9-days) in terms of CO_2 emission and to understand the relationship of soil temperature and soil moisture with CO_2 emission. The study was conducted according to arranged in a complete randomized block design with three replications as a pot study in greenhouse conditions. The frequent irrigation and using high amount of manure were increased CO_2 emission. Although the same amount of organic matter was provided to the soil in different amounts of sheep and poultry manures, CO_2 emission was higher in sheep manure. Soil temperature increased by irrigation at infrequent intervals and high amount of manure. Moisture retention in the soil increased by using high amount of manure. The linear relationship of soil temperature (R^2=0.922) and soil moisture (R^2=0.895) with CO_2 emission was found to be quite significant ($P<0.01$). As a result of the study, using low amount of poultry manure (15 or 30 t ha^{-1}) instead of sheep manure and irrigation at infrequent intervals (9-days) can be suggested as precautions to decrease CO_2 emissions.

Keywords: CO_2, irrigation interval, manure, soil organic matter, wetting-drying cycles

Received: December, 2020; Revised final: February, 2021; Accepted: March, 2021

* Authors to whom all correspondence should be addressed: e-mail: caneryerli@yyu.edu.tr; Phone: +90 5324316565; Fax: +90 4324445065