Tropentag, September 16-18, 2015, Berlin, Germany

"Management of land use systems for enhanced food security: conflicts, controversies and resolutions"

CO_2 Efflux in Vertisol under a Wheat Field and Tamaulipan Thornscrub Vegetation in Northeast Mexico

María Inés Yáñez Díaz[1], Israel Cantu Silva[2], Humberto Gonzalez Rodriguez[1], José Marmolejo-Moncivais[3], Enrique Jurado[1], Marco V. Gómez Meza[4], Rodolfo Alejandro Martinez Soto[2]

[1] *Universidad Autónoma de Nuevo León, Faculty of Forest Sciences, Mexico*
[2] *Universidad Autónoma de Nuevo León, Agroforestry, Mexico*
[3] *Forestry College, UANL, Management and Conservation of Biodiversity,*
[4] *Universidad Autónoma de Nuevo León, Fac. of Economy, Mexico*

Abstract

Soil respiration is an important component of the terrestrial carbon budget and is considered the second-largest factor in the flux of carbon between the earth's ecosystems and the atmosphere. It has been pointed out that any increase in soil CO_2 emissions in response to environmental change have the potential to substantially increase atmospheric CO_2 levels and to provide a positive effect to global warming. Thus, determinations of CO_2 efflux, soil temperature and soil-water content were monitored, weekly during 2015. At each sampling date, two daily measurements (at 08:00 and 14:00 h local time, named as morning and afternoon, respectively) were carried out. A dynamic closed chamber with a portable system EGM employing a infrared gas analyzer (IRGA) and a soil chamber (SRC-1) was used to assess soil CO_2 efflux in four replications in vertisol under two land use in northeastern Mexico: a native undisturbed thornscrub and a *Triticum aestivum* field. Results have showed a significant relationship between morning and afternoon soil respiration rate and soil temperature, while a no significant relationship between soil water content and soil respiration for both land use was found. During the studied period, total average morning soil respiration rates for both land use ranged from 2.3 to 14.4 micromol CO_2 m^{-2} s^{-1}, while afternoon soil respiration rates ranged from 2.6 to 28.8 micromol CO_2 m^{-2} s^{-1}. Average morning and afternoon soil respiration rates were higher in thornscrub than *Triticum aestivum* plot; indicating that thornscrub vegetation showed the highest average morning and afternoon soil respiration rates; 9.9 and 14.6 micromol CO_2 m^{-2} s^{-1}, respectively. In contrast, crop field showed the lowest average morning (4.5) and afternoon (5.5 micromol CO_2 m^{-2} s^{-1}) soil respiration rates. In vertisol the soil CO_2 efflux varies with land use, is higher in the afternoon and it is related with soil temperature. Field observations have also illustrated the need of research efforts in vertisol under dry periods, especially when soil water content drops below 15 %, in order to explain the dynamics of the CO_2 balance of different land use.

Keywords: CO_2 efflux, Land use systems, soil respiration, Tamaulipan thornscrub, *Triticum aestivum*, Vertisol

Contact Address: María Inés Yáñez Díaz, Universidad Autónoma de Nuevo León, Faculty of Forest Sciences, Carretera Nacional km 145, 67755 Linares , Mexico, e-mail: inesyd@gmail.com