EFFECT OF AGRONOMIC AND ENVIRONMENTAL FACTORS ON CO_2 EMISSIONS ON A DRYLAND ROTATION

Carbonell-Bojollo, R1., González- Sánchez, E2,3.,Ordóñez- Fernández, R1., Basch, G4.,Repullo Ruibérriz de Torres, M.A1

1 Department of Ecological Production and Natural Resources, "Alameda del Obispo" IFAPA, Apdo. 3092, 14080 Córdoba, Spain.
2 Rural Engineering Department, University of Córdoba, Edificio Leonardo Da Vinci. Campus de Rabanales, Ctra. Nacional IV, km. 396, 14014 Córdoba, Spain.
3 Spanish Association for Conservation Agriculture. Living Soils (AEAC.SV). IFAPA Alameda del Obispo. Av. Menéndez Pidal s/n. 14004. Córdoba, Spain.
4 Institute of Mediterranean Agricultural and Environmental Sciences (ICAAM), University of Evora, Portugal
(*)Corresponding author: rosario.carbonell@juntadeandalucia.es

ABSTRACT

Agriculture is a substantial source of greenhouse gas emissions (GHG) in many countries.
Conservation agriculture includes soil management systems that help to reduce CO_2 emission levels.
However, there are many factors involved in the production of these emissions such as soil management type and time at which the agriculture operations are performed, crop phenological state, the weather, and handling of the residue amongst others. In the long term, the relationships that exist between these factors seem to determine the balance of these emissions.

In this study, we analyzed the influence of the soil management system as well as the climatology of the different seasons studied and the phenological state of the different crops implanted.

For this purpose a field trial was conducted in Las Cabezas de San Juán (Seville). This pilot farm consisted of six experimental plots with an approximate area of 5 ha; conservation agriculture practices were employed in three of the six plots while traditional tillage management was used in the other three. Within these plots the three crops of the wheat-sunflower-legume rotation were tested simultaneously.

The study was conducted over four agricultural seasons - 2009/10, 2010/11, 2011/12 and 2012/13. Each of these cropping seasons were characterised by very different rainfall amounts, registering a total of 814.4, 721.6, 268.2 and 676.4 l/m2 respectively.

When we studied the evolution of emissions over four seasons, an increase could be observed for both management systems during the time in which the crops were established due to the roots respiration processes. These increases were heavily influenced by the rainfall recorded during the time in which the crop was in place.

In the case of wheat, higher emissions were produced during the cultivation time of the first and fourth season during which 84% and 60% of the total rainfall of each season was recorded. These emissions were 9 and 5 kg CO2/ha for conventional tillage and no tillage, respectively for the 2009/10 season and 11.7 and 6.8 kg CO2/ha, respectively in the 2012/13 season. Conversely during the 2011/12 season, a season in which lower precipitation was registered, the higher emissions were comparatively minor with respect to the previous values, specifically 3.7 and 1.9 kg CO_2/ha for non-tillage and conventional tillage.

Keywords: CO_2 emissions, no tillage

POSTER