Soil Organic Sequestration in Irrigations Farm of Black River Valley, Argentina

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Abstract

Larger water application by irrigation increases biomass productivity and consequently soil C input through residues and roots, changes mineralization rates, and alters the carbonate balance. Most irrigation is in areas with low levels of Soil Organic Matter (SOC) in the native state. Therefore, there is a large potential for carbon sequestration by the use of gravitational irrigation. Irrigated crops are grown on about 50.000 ha in the upper Valley with gravitational border and furrow irrigation system. For this work 29 farms located in Cipolletti Irrigation District, with crops pear and gravitational furrow irrigation. The edaphic variables selected: organic carbon, plantation age, soil texture, soil depth, soil drainage, pH and electrical conductivity. By using statistical programs multiple regressions equations, simulations of different scenarios allow to relate the stock of C ha^{-1} yr^{-1}, according to variations in clay, the permanents years of irrigation and soil pH. The stock of t C ha^{-1} yr^{-1} have average values ranging from 0.50 t C ha^{-1} yr^{-1} the first 15 years, to 0.17 t C ha^{-1} in the next 30 years. The average carbon stock values are 0.28 t C ha^{-1} yr^{-1}. Excessive irrigation, lack of proper drainage, and use of poor-quality irrigation water accentuate the risks of soil salinization. Use of proper irrigation methods and improved cropping systems is therefore essential to reap the benefits of irrigation in enhancing productivity and soil carbon sequestration. The gravitational irrigation border and furrow System minimizes the emission of CO_2 and enhances carbon sequestration in the fight against global warming.

Keywords: carbon storage, gravitational irrigation, climate change