Ameliorative Effects and Soil Carbon Sequestration Potential of Organic and In-Organic Amendments in Salt-Affected Soils in A Semi-Arid Region of Asia

Zia Ur Rahman Farooqi[1], Mohd Sabir[1], Hamaad Raza Ahmad[1], and Muhammad Arfan[1]

[1]University of Agriculture Faisalabad

September 25, 2021

Abstract

Soil salinity is a big concern and main factor which limit crop productivity. Salt-affected soils can be reclaimed and used for crop production as well as atmospheric carbon sink. In this study, gypsum (G), organic amendments and their combinations were used to remediate marginally salt-affected soils and increasing carbon stocks in three areas (Dijkot, Uchkera and Jhang). Gypsum along with farmyard manure (FYM), poultry manure (PM) and green manure (GM) were used in this study. Except control, treatment 1 received 100% soil gypsum requirement (SGR), all other 3 treatments received 50% SGR and equal amounts of FYM, PM and GM, respectively. A 45 day's incubation study comprising 0-, 15-, 30- and 45-days intervals resulted that 45 days interval was more effective in remediation than others. All the amendments effectively reclaimed the salt-affected soils and increased soil carbon stocks by increasing carbon sequestration rate through reduction in soil pH (up to 19%), electrical conductivity (EC) (up to 28%) and sodium adsorption ratio (SAR) (up to 71.55%). While cation exchange capacity (CEC) (up to 39%), soil organic matter (SOM) (up to 65%), and total nitrogen (TN) (up to 96%) was increased. SOM increase and carbon sequestration was best seen (62%- or 12.59-tons ha-1) in 50% G and FYM application as compared to control (4.45-ton ha-1) in S-1. Results obtained helps in concluding that G and its combinations with organic amendments can effectively reduce the salt concentration in salt-affected soils and helps in organic matter build-up to support crop production and carbon sequestration.

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