



Effect of Tillage Practices and Straw Incorporation on some Soil Properties in a Saline-Sodic Soil

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Abstract—An experiment was conducted to assess the effect of tillage practices and straw incorporation on some soil properties in a saline-sodic soil in a farmers' field situated in Khipro district, Sanghar, Sindh, Pakistan. The treatments were: two tillage practices (shallow tillage and deep tillage, ST and DT, respectively), NPK (conventional practice) and control (no straw and no gypsum, CK), three rates of wheat straw (3, 7 and 10 ton.ha⁻¹) and three levels of gypsum (25% GR, 50% GR and 75% GR). The treatments were arranged in a randomized complete block design (RCBD) with four replications. After two years, the straw incorporated treatments (i.e., shallow tillage: ST_{WS10} - ST_{WS3} and deep tillage: DT_{WS10} - DT_{WS3}) led to significant reduction in bulk density, EC_e, pH, SAR and ESP and increase in soil porosity as compared to those of without straw incorporated treatments (i.e., ST_{NPK} and DT_{NPK} and ST_{CK} and DT_{CK}). The reduction in bulk density, EC_e, pH, SAR and ESP and increase in soil porosity were found in the order DT_{WS10} > ST_{WS10} > DT_{WS7} > ST_{WS7} > DT_{WS3} > ST_{WS3}. Greater decrease in bulk density, EC_e, pH, SAR and ESP and increase in soil porosity were recorded in deep tillage treatments (i.e., DT_{WS3}, DT_{WS7}, DT_{WS10}, DT_{NPK} and DT_{CK}) as compared to those of shallow tillage treatments (i.e., ST_{WS3}, ST_{WS7}, ST_{WS10}, ST_{NPK} and ST_{CK}). The maximum reduction in EC_e, pH, SAR and ESP and improvement in soil porosity were observed under DT_{WS10GR75}, while minimum was witnessed in ST_{WS3GR25}. This study demonstrated that tillage practices with straw incorporation can improve soil properties in saline sodic soil, but significant results could be achieved at 10 ton.ha⁻¹ wheat straw incorporation at 75% gypsum requirement under deep tillage treatments than those of shallow tillage treatments only after two years.

Keywords— Soil, Chemical Properties, Gypsum, Wheat Straw, Tillage, Reclamation