Response of corn (*Zea mays* L.) root growth to soil salinity and compaction under greenhouse conditions

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Abstract

Soil salinity and compaction are probably the most prevailed limitations for crop growth and production. Their mitigation and control may be important crop management keys that can ensure yield sustainability and optimum use of land and water. This research was performed to investigate the combined effect of soil salinity and soil compaction on some growth characteristics of corn (*Zea mays* L.) root. For this purpose, a factorial pot experiment on the basis of completely randomized blocks design with three replications was performed. The experimental factors were three levels of soil salinity (electrical conductivity of saturated paste extract of 1.5, 2.5 and 4.5 dS/m) and three levels of soil compaction (bulk density of 1.3, 1.55 and 1.75 g/cm^3). For salinity treatments, different amounts of NaCl was dissolved in the required volume of distilled water to have soil water content to 16% and then were added to the soil. For soil compaction treatments, a 4.5 kg solid cylinder was allowed to fall freely from 45 cm height over the soil surface in the pots. During the 3 months of experimental period, the pots were irrigated with distilled water through regular weighing. Results showed that the main effects of soil salinity and compaction at 1% probability level and their combined effects at 5% probability level led to significant reduction in root dry weight, root volume, root length, root mean diameter and ratio of root weight to soil weight. Combined effects of soil salinity and compaction reduced growth characteristics of the corn roots 20% more than their individual effect. Therefore, it can be concluded that soil salinity and compaction intensify their negative effects and suppress growth and development of corn roots.

Keywords: Soil management, Root development, Environmental stresses, Electrical conductivity, Bulk density.

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