Publications

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Gypsum and Polyacrylamide Soil Amendments Used With High Sodium Wastewater

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- Full Text

Using wastewater for irrigation of crops represents an attractive alternative to disposal. Typically, municipal wastewaters are high in sodium, and the resulting high sodium absorption ratio (SAR) alters the soil structure making it more impermeable to air and water. The present study tested the hypothesis that gypsum applied after disking and anionic polyacrylamide (PAM) applied in solution reduce crust formation and improve the infiltration rate of water into soil irrigated with water high in salt and sodium. Two soil amendments were applied to plots furrowirrigated with wastewater. The amendments were gypsum (11 Mg ha^{-1}), and PAM added to irrigation water at rates of 25 mg L^{-1} PAM applications were made during every irrigation and during every second irrigation. In addition, two column experiments were performed to measure hydraulic conductivity. In Experiment 1, PAM was applied to undisturbed soil profiles at rates of 5, 10, and 15 x 10^{-6} g PAM cm^{-3} of soil. In Experiment 2, two levels of PAM (0 and 25 ml L^{-1}) and three levels of wastewater (20, 40, and 60 mm) were applied to disturbed soil profiles.

Field saturated infiltration (K_{fs}) rates of PAM- treated plots were approximately double those of the control, and significantly different ($P<0.05$) from non- irrigated plots. Gypsum was also beneficial but not as effective as PAM. The effectiveness of PAM persisted several weeks after the last PAM application. The results suggest that the deleterious effects of irrigation with this wastewater on soil permeability can be effectively ameliorated using anionic polyacrylamide polymers. The ability of PAM to improve saturated hydraulic conductivity (K_S) in laboratory column studies was variable and not always correlated with levels of polymer added. Also, combinations of PAM and irrigation levels interacted significantly ($P<0.05$).

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