

Water Productivity and Corn Yield in Corn-Wheat Rotation Affected by Irrigation and Tillage Methods

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Abstract

Individual effects of conservation tillage and irrigation methods on corn yield and water productivity have been adequately investigated so far, but simultaneous effects of these treatments on corn production have not received enough attention. Therefore, in this research, effect of conservation tillage and irrigation methods on soil properties, water productivity, and corn yield was evaluated using a split plot experimental design with nine treatments and three replications. Main plots were allocated to irrigation methods including surface irrigation (gated pipe), tape irrigation, and sprinkler irrigation. Tillage methods including zero tillage (direct drilling), reduced tillage, and conventional tillage were in the sub plots. Soil bulk density, forage moisture content, water consumption, corn yield, and water productivity were measured in different tillage and irrigation treatments. Results showed that no-till increased soil bulk density at soil depth of 0-10 cm compared to the reduced and conventional tillage methods (9 and 4%, respectively); while, irrigation method had no significant effect on soil bulk density. Irrigation method had a significant effect on corn grain yield so that pressurized irrigation methods had the maximum corn yield, while the minimum corn yield was obtained from the surface irrigation. However, corn yield was not affected by tillage method. The maximum water consumption occurred in surface irrigation, and drip irrigation had the minimum. Drip irrigation saved 34% and 57% water compared to the sprinkler and surface irrigation methods, respectively. Water productivity in corn was significantly affected by irrigation methods; while, tillage methods had no significant effect on water productivity. The maximum water productivity (1.22 kg/m³ on average) was obtained in drip irrigation and the minimum water productivity (0.34 kg/m³ on average) belonged to the surface irrigation.

Keywords: Direct seeding, Silage water content, Soil bulk density

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