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Irrigated sugarbeet yield, water use and water use efficiency responses to tillage practices

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Better management practices have been used to increase soil water storage and reduce evaporation from the soil surface to optimize crop water use efficiency (WUE) in irrigated agriculture. A field study was conducted to evaluate the effect of conventional tillage (CT), No-till (NT) and strip tillage (ST) practices on yield, water use (WU) and WUE of sugarbeet (*Beta vulgaris* L.) on a clay loam soil under over-head sprinkler irrigation system in the northern Great Plains. Tillage treatments were replicated five times in a randomized block design. Seasonal WU and WUE for sugarbeet root and sucrose yield were determined for the 2018 and 2019 growing seasons according to the water balance and WUE equations under three tillage practices. Results showed that no significant differences due to tillage treatment were found for crop WU, root yield, sucrose yield, and WUE for sugarbeet root and sucrose in 2018 and 2019 growing seasons. In 2019, the average value of WU across three tillage systems (616 mm) was significantly greater relative to 2018 (468 mm) due to atypical large rainfalls (218mm) occurred in September of 2019. Consequently, WUE values for both root and sucrose yield in 2019 under CT, NT, and ST were significantly greater than those in 2018. While NT and ST practices are promising alternative to CT for agricultural production in this region, further research is needed prior to making any recommendation.