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68-10 Sunflower Water Productivity In Four Great Plains Soils.

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Henry Gonzalez Convention Center, Hall C, Street Level

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Sunflower (*Helianthus annuus* L.) is a drought-adapted crop with a short growing season that reduces irrigation requirements and makes it ideal for regions with limited irrigation water supplies. Our objectives were a) to evaluate the yield potential of sunflower under deficit irrigation and b) determine if water productivity (WP) and irrigation water productivity (IWP) of sunflower were affected by soil textural class differences. Another objective was to compare the relationship to a benchmark maximum productivity relationship for consideration of limitations to crop yield in a semiarid environment. Sunflower was grown in 2008 and 2009 in 48 weighing lysimeters containing soil monoliths of clay loam, silt loam, sandy loam or fine sand (12 each) at Bushland, TX, USA, a semiarid region of the southern Great Plains. Irrigation treatments were 25%, 50%, 75% and 100% replacement of evapotranspiration. The WP of the crops in the fine sand ( $0.54 \text{ kg m}^{-3}$ ) was larger than that of the crops in the silt loam ( $0.46 \text{ kg m}^{-3}$ ) and clay loam ( $0.44 \text{ kg m}^{-3}$ ). The IWP of the crops in the fine sand ( $1.0 \text{ kg m}^{-3}$ ) and the sandy loam ( $0.96 \text{ kg m}^{-3}$ ) were significantly larger than the IWP of the crops in the clay loam ( $0.72 \text{ kg m}^{-3}$ ). Yields were as much as 30% lower at full irrigation levels compared with benchmark maximum yields. Limitations to increased yield include high evaporative deficits and soil water evaporation. Although sunflower may be a drought tolerant crop, maximum yields may difficult to achieve due to the climatic conditions in the southern Great Plains.

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