CORN-VELVETLEAF INTERFERENCE UNDER VARIABLE WATER SUPPLY. Logan G. Vaughn, John L. Lindquist, Mark L. Bernards and Timothy J. Arkebauer, Graduate Research Assistant, Associate Professor, Assistant Professor, and Professor, Department of Agronomy and Horticulture, University of Nebraska-Lincoln, Lincoln, NE 68583.

Rainfall during the corn growing season is highly variable throughout Nebraska and the north central USA and greatly impacts all aspects of agroecosystems and their management. Better understanding of the growth response and competitiveness of crop and weed species to varying water supply can improve both crop and weed management decisions. Field experiments were conducted at Clay Center, NE to determine the effects of variable water supply on corn and velvetleaf interference. Corn planted at 7.6 and 7.3 plants $m^{-2}$, in 2007 and 2008, respectively, was grown in monoculture and in mixture with velvetleaf at densities of 2, 6, and 12 plants $m^{-1}$ row. A linear move irrigation system was used to maintain water treatments at 0, 25, 50, and 100% full replacement of evapotranspiration. Volumetric water content was measured in selected treatments within the top 20 and 50 cm of soil using time-domain reflectometry (TDR) in 2007 and a $TH_2O$ probe in 2008. Weed-free corn yield was greatest (12.7 Mg $ha^{-1}$) in the 50% irrigation treatment in 2007 and did not vary among the other three irrigation treatments (11.4 Mg $ha^{-1}$). Corn yield loss increased with velvetleaf density in all treatments. Yield loss was greatest in the 25% treatment followed by the 50%, 0% and 100% treatments Volumetric soil water content was greatest in the 100% irrigation treatment throughout the season. A substantial drought period occurred between 30 and 50 DAE, during which the 25 and 50% irrigation treatments had the smallest volumetric water content. Yield loss increased linearly with increasing velvetleaf leaf area index (LAI) within an irrigation treatment, but the intercept of this relationship varied among irrigation treatments, indicating that plant size was not the main contributor to the amount of yield loss observed between water treatments. Difference between corn and velvetleaf height was greatest in the 100% irrigation treatment, reducing the competitive ability of velvetleaf and thereby yield loss in this treatment. In 2008, weed-free corn yield was greatest (14.2 Mg $ha^{-1}$) in the 50% irrigation treatment and did not differ among the other three irrigation treatments (13.3 Mg $ha^{-1}$). Wet and cool early season temperatures contributed to a delay in velvetleaf emergence resulting in reduced growth and competitive ability throughout the season in 2008. Corn yield loss increased with velvetleaf density only in the 0 and 100% irrigation treatments. Corn yield loss was greatest in the 0% irrigation treatment followed by the 100, 50, and 25% treatments. Volumetric soil water content was similar among treatments throughout the vegetative growth stage of corn but was smaller in the 0% irrigation treatment from anthesis until physiological maturity. This presumably resulted in water stress during grain fill and a higher yield loss in this treatment. Corn yield loss increased as velvetleaf LAI increased in all treatments. Difference between corn and velvetleaf height was smallest in the 0% treatment, resulting in increased competition between these species and subsequently smaller soil water content in these treatments. This study has shown that velvetleaf has an even greater impact on corn yield under conditions of limited water supply. Therefore, our results suggest that crop tolerance to velvetleaf interference is greatest when there is sufficient soil water available to supply the full water demand of the corn crop.

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