THE EFFECT OF VARIABLE WATER SUPPLY ON CORN AND VELVETLEAF. Logan G. Vaughn, John L. Lindquist, and Mark L. Bernards, Graduate Research Assistant, Associate Professor, and Assistant 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 crop production. 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. A field experiment was initiated at Clay Center, NE in 2007 to determine the effects of variable water supply on corn and velvetleaf interference. Corn planted at 7.6 plants m^{-2} 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 predicted evapotranspiration (ET). Volumetric water content was measured in selected treatments within the top 20 and 50 cm of soil using time-domain reflectometry (TDR). Weed-free corn yield was greatest (11.0 Mg ha^{-1}) in the 100% ET replacement treatment but did not differ between the 0, 25 and 50% ET replacement treatments (8.6 Mg ha^{-1}). Corn yield loss in velvetleaf mixture treatments increased with velvetleaf density in all treatments. Corn yield loss as weed density approaches zero was greatest (50 $plant^{-1}$) in the 25 and 50% ET replacement and smallest (5 $plant^{-1}$) in the 100% ET replacement treatments. Yield loss in the 0% replacement treatment was intermediate between the 100 and 25% replacement treatments. Volumetric soil water content was smallest in the 0% ET replacement treatment between emergence and the V7 stage of corn development (ca. 25 DAE) and may have reduced velvetleaf growth during this period. A substantial drought period occurred between 30 and 50 DAE, during which the 25 and 50% ET replacement treatments had the smallest volumetric water content. We believe that the smaller plants in the 0% ET treatment during early growth were not able to reduce the soil water content to the same level as the larger 25 and 50% ET plants during the later drought period. This resulted in reduced interspecific competition for water, contributing to lower yield losses at 0% ET replacement compared to the 25 and 50% levels. Number of velvetleaf seed capsules produced per unit area increased with increasing velvetleaf density in all water treatments. Greatest capsule production (ca. 130 capsules m^{-2}) occurred at 12 plants m^{-1} row in the 0% ET replacement and smallest at 2 plants m^{-1} row in the 100% ET replacement treatment. Corn yield loss and velvetleaf capsule production were lowest in the 100% ET replacement treatment, indicating that velvetleaf is less competitive under ample water supply conditions. Our results suggest that crop tolerance to velvetleaf interference is greatest when there is sufficient soil water available to supply the full ET demand of the corn crop.

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