COMMON WATERHEMP INTERFERENCE IN CORN. Joseph C. Cordes and William G. Johnson, Graduate Research Assistant and Assistant Professor, Department of Agronomy, University of Missouri, Columbia, MO 65211.

Field studies were conducted at Columbia, Novelty, and Albany, MO in 2001 and 2002 on Mexico silt loam, Putnam silt loam, and a Grundy silt loam soils respectively, to determine the effects of common waterhemp interference on corn growth, biomass, nitrogen accumulation, and yield. Ammonium nitrate fertilizer (NH_4NO_3, 180 kg ha^{-1}) was surface applied prior to planting. An EPOST (7-cm weeds) application of imazethapyr + imazapyr and bromoxynil was applied to control annual weeds except for waterhemp. Waterhemp was allowed to infest the experiment and treated at heights of 8, 15, 23, 31, 38 or 46 cm with dicamba + diflufenzopyr followed by hand hoeing 7 days after the herbicide treatment. These treatments were kept weed free after waterhemp removal. Corn and weed biomass, heights, fresh weights, and dry weights were collected at each waterhemp removal timing and at corn harvest from the Columbia site. The other two sites were utilized for yield data at different weed removal timings. Corn and waterhemp plant samples were analyzed for total nitrogen content. Corn leaf color was recorded with a SPAD^{tm} meter and soil water content measured with a portable time domain reflectometry probe (TDR) from the weed-free and weedy treatments at each removal timing. Corn yield responded differently to environments and waterhemp densities. Yield was not reduced at sites that had adequate season-long moisture via irrigation. All other locations had yield reduction from season long competition. Waterhemp densities of 369 to 445 plants m^{-2} reduced yield 17 to 36% depending on removal timing. Lower densities (35 to 82 plants m^{-2}) reduced yields 6% when allowed to remain with corn season long. In Columbia 2001, waterhemp biomass contained 3.8% N when it was 8 cm tall, but only 2.0% N when it was 38 cm tall. In 2002, waterhemp contained between 4.4 and 5.1% N. This suggests that N is accumulated in greater quantities when soil moisture is not limiting. On a per hectare basis, waterhemp accumulated 3.3 and 15.6 kg of N by the time it was 38 cm tall in 2001 and 2002 respectively, while corn biomass accumulated 57.2 and 81.9 kg N. This indicates that waterhemp is capable of accumulating N at a very rapid rate early in the growing season. Soil moisture deficits were observed at 4 of the 6 removal timings at high waterhemp densities, while no water deficits were observed with low waterhemp densities. Corn leaf color as measured by the SPAD^{tm} meter correlated with plant tissue analysis for nitrogen (R^2=0.82). When sites were grouped by waterhemp density there was only one instance where nitrogen content of corn was reduced early in the season with high waterhemp densities.